REVIEW OF
AUSTRALIA'S AUTOMOTIVE INDUSTRY

FINAL REPORT

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Senator the Hon Kim Carr
Minister for Innovation, Industry, Science and Research
Parliament House
CANBERRA ACT 2600

Dear Minister

I am pleased to submit my report on the Review of Australia's Automotive Industry.

This Review, commissioned by you on behalf of your Government, comes at a crucial time for automotive production in Australia.

A time when the industry is under considerable pressure due to a combination of externalities including the appreciation of the Australian dollar, higher fuel costs, cleaner emission requirements and intense worldwide competition.

Despite these challenges, the industry has been transforming into a more globally integrated and competitive one. This Review, therefore, recommends that the process of transformation continues through a new transition phase with the ultimate aim of achieving economic and environmental sustainability by 2020.

In particular, the Review recommends considerable new opportunities for Australia's automotive industry in new cleaner-emissions technology.

To that end, one of the key recommendations of this Review is the bringing forward and doubling of the Green Car Innovation Fund combined with the inclusion of transportation in any new emissions trading scheme.

These two initiatives should result in Australia's automotive industry changing vehicle production capacity to become more fuel-efficient, lower CO_2-emitting and more internationally focused.

Additionally, this Review recommends considerable change to the existing transitional arrangements, while continuing with a lower tariff regime.

In particular, the Review recommends that the existing Automotive Competitiveness and Investment Scheme be reformed into a new Global Automotive Transition Scheme, which supports greater innovation through enhanced research, development and design.

The new scheme also provides a mechanism to support structural adjustment in the Australian automotive supply chain in order to move towards supply arrangements that are more reliable and consolidated. This should, in appropriate circumstances, include fair and reasonable structural adjustment assistance for displaced automotive employees.

The emphasis on exports of assembled vehicles and component parts is also reinforced, noting that the Australian automotive industry is crucial to our worldwide trading position.

The Review confirmed the importance of the automotive industry to Australia's economy. For example, automotive product exports in 2007 were $4.7 billion—establishing the industry amongst Australia's top 10 export earners and the largest exporter of elaborately transformed manufactures. The industry earns more export income than more traditional industries such as wine, wheat and wool.

The automotive industry is also a major investor in innovation, accounting for nearly 17 percent of all manufacturing business expenditure on research and development (R&D). In addition, the R&D intensity of the industry is around three times higher than for manufacturing as a whole and around nine times higher than for the economy. This is a key element to sustaining an internationally competitive industry based on high skills and high-wage jobs.

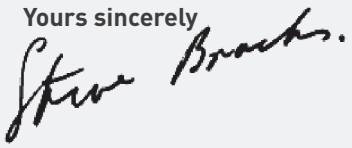
Australia is one of only 15 countries with the capability to take a car from concept all the way to full production. This capability encompasses strong skill sets in R&D, design, engineering, product and process development, and advanced manufacturing. The industry is also well placed to take advantage of its proximity to Asia, particularly China and India, which are expected to be major contributors to the growth in light vehicle production and sales.

The industry has important links to the rest of the economy, and supports Australia's capabilities in designing and manufacturing elaborately transformed goods. For example, the advanced manufacturing sector relies on the capital investment by the vehicle manufacturers and major Tier 1 companies, while other manufacturers are heavily reliant on the skills and expertise of the automotive component sector. Without this skills base, industries such as the truck industry would struggle to manufacture locally. This could be to the detriment of other important sectors such as transport and resources.

The Review benefited from consultations with stakeholders and with the leaders of other concurrent reviews. The latter included Dr Terry Cutler, Professor Ross Garnaut, Professor Roy Green and Mr David Mortimer AO.

In concluding, I would like to thank the Review's Expert Panel members—Mr Tim Harcourt, Mr Peter Upton, Dr Elizabeth Webster and Mr Nixon Apple—for their important contribution and assistance in preparing this report. The support provided by the Innovation Department's secretariat was also invaluable. Furthermore, I would like to thank all those individuals, organisations and companies that made submissions to the Review, as well as the Productivity Commission which modelled the economy-wide effects of future assistance arrangements. These proved very helpful to the Panel in assessing the merits of various policy options.

Yours sincerely



Hon Steve Bracks
Leader
Review of Australia's Automotive Industry

CONTENTS

TERMS OF REFERENCE FOR THE REVIEW OF AUSTRALIA'S AUTOMOTIVE INDUSTRY

1. The Australian automotive industry plays an important role in employment, exports and innovation in the Australian economy. In particular, innovation in the automotive industry results in significant spillover effects across the economy, and particularly the manufacturing sector. In this context, the Australian Government has commissioned a high level review panel to conduct a review of the automotive sector, in consultation with a broad range of industry stakeholders. This review is to take place concurrently with a wide-ranging review of Australia's national innovation system and should have regard to the issues raised in that review.
2. The Review will bear in mind the Government's desire:
    a. for an internationally competitive and globally integrated automotive manufacturing sector; and
    b. to optimise the overall economic performance of the Australian economy, including limiting price impacts on Australian consumers and businesses.
3. The Review is to report on key outcomes of the current policy settings for the automotive manufacturing sector, including:
    a. an evaluation of the key outcomes of the Automotive Competitiveness and Investment Scheme (including an assessment of the impacts on each of the four categories of participants in the Scheme);
    b. an assessment of the legislated passenger motor vehicle tariff reductions, taking into account the global automotive sector and general trade environment; and
    c. an assessment of current and prospective trade obligations arising from Australia's multilateral, regional and bilateral commitments.
4. The Review will evaluate the appropriateness of the Automotive Competitiveness and Investment Scheme (ACIS) in the current competitive environment in relation to:
    a. the possible retargeting of assistance within ACIS; and
    b. investigating, identifying and evaluating possible alternative assistance mechanisms, consistent with Australia's international trade obligations.
5. The Review will also make an assessment of the challenges and opportunities currently facing the sector, including how those challenges and opportunities might impact on the long-term viability and sustainability of the sector. In making this assessment, the Review should take account of factors such as:
    a. the strengths and weaknesses of the sector;

b. recent developments and expected future developments and conditions in the global automotive sector, including:

   i. opportunities for, and barriers to, enhanced global integration;

   ii. competition for investment in the global sector; and

   iii. progress on trade liberalisation (including free trade agreements) in the automotive sector in both existing and prospective export markets for Australia.

c. the impact of climate change and changing consumer preferences towards low emissions and fuel efficient vehicles; and

d. other possible hindrances to the viability of the sector on both the demand and supply sides, such as exchange rates, petrol prices, skill shortages and other environmental issues.

6. The Review will make recommendations on any of the issues identified, including:

   a. measures to boost innovation in the sector and to take advantage of the highly innovative nature of the automotive industry;

   b. measures to ensure that suitably skilled people are available and that fair working practices are guaranteed;

   c. the impact of climate change policy on the automotive industry;

   d. the delivery of the Australian Government's Green Car Innovation Fund from 2011;

   e. facilitating leadership among Australian automotive producers and component suppliers in developing and adapting fuel efficient technologies and know-how in the production of motor vehicles in Australia; and

   f. improving Australian companies' access to global supply chains and export markets.

7. The Review is to provide an interim report to the Government by 31 March 2008 and a final report by 31 July 2008.

REVIEW LEADER'S SUMMARY— REVIEW OF AUSTRALIA'S AUTOMOTIVE INDUSTRY

The Australian Automotive Review is predicated on providing advice to the Federal Government on measures required to achieve an economically and environmentally sustainable Australian automotive industry.

The Australian automotive industry has been transformed to a more globally integrated and competitive industry.

This transition needs to be enhanced and advanced so that the Australian automotive industry achieves economic and environmental sustainability by 2020. In doing so, the industry will continue to provide Australia's largest non-resource export product.

To achieve these aims, the Review continues the policy settings over the last two decades of phasing down tariff support, encouraging increased exports and enhancing innovation through more effective research, development and design. The Review also takes account of the significantly changed conditions since 2002 due to the appreciation of the Australian dollar, higher fuel costs, cleaner emission requirements and new free trade agreements.

The new recommendations acknowledge these changes and, as a consequence, propose new transitional arrangements to enable the Australian automotive industry to be world-competitive and viable, including:

- replacing the Automotive Competitiveness and Investment Scheme's production volume subsidy with a new Global Automotive Transition Scheme designed to support research, development, design and export while assisting in the restructure of the Australian supply chain to be more competitive and reliable;
- bringing forward, and doubling to $1 billion if successful, the Green Car Innovation Fund and recommending guidelines for the total supply chain (nationally and internationally) and research institutions to develop green car innovation technologies;
- encouraging the Australian Government to include transportation (including fuel) in an emissions trading scheme, further enhancing green car technologies;
- reducing the passenger motor vehicle tariff to 5 percent by 2010, making Australian car tariffs the third-lowest amongst major automotive-producing economies in the world (and with an import-weighted tariff rate of between 3 and 4 percent);
- encouraging expanded free trade agreements, particularly with the Gulf States, the Association of Southeast Asian Nations and South Africa;
- expanding overseas markets through a 'Team Australia' approach using eminent automotive ambassadors;

- harmonising, and in some cases reducing, passenger motor vehicle taxes, including state stamp duty and vehicle registrations, while encouraging governments to support an environmentally sustainable Australian industry; and
- establishing a new Automotive Industry Innovation Council to provide advice and oversight in relation to the new transitional arrangements and including a reference group providing advice on automotive skills matters to Manufacturing Skills Australia.

The Review's recommendations are predicated on changing the behaviour of automotive firms and the industry to make them more competitive and better able to meet global challenges, including the move to a lower carbon environment, over the long term.

REPORT STRUCTURE AND SUMMARY OF RECOMMENDATIONS

STRUCTURE OF THIS REPORT

This Australian Automotive Review report is structured as follows:

- Chapters 1 to 6 examine the existing Australian and global automotive industries, including current industry assistance arrangements and support for innovation. These chapters contain findings by the Review but no recommendations.
- Chapters 7 to 11 address proposed future arrangements to assist the Australian automotive industry. These chapters also address current and proposed market access, environmental issues, industry restructuring and vehicle safety arrangements. They contain both findings and recommendations (except Chapter 11, which contains recommendations only).
- The Review's recommendations are summarised below. To facilitate an understanding of them as a comprehensive package of future automotive assistance measures, they are grouped under thematic headings and not necessarily by chapter.
- Appendixes A to N supplement information contained in the main body of the report.

THEMATIC SUMMARY OF RECOMMENDATIONS

A new Global Automotive Transition Scheme (Chapter 11)

- A new, retargeted transitional program titled the Global Automotive Transition Scheme should be legislated in 2009 and commence in 2010. The Global Automotive Transition Scheme would complement, and be additional to, the Australian Government's Green Car Innovation Fund.
- There are three options for funding the Global Automotive Transition Scheme and other measures recommended in this report. These are:
  - *Option 1:* Funding for the Global Automotive Transition Scheme over the five years to 2015 (inclusive) should be $1.5 billion in capped assistance. An additional tranche of funding of $1 billion in capped assistance should be provided from 2016 to 2020, with this front-loaded and reducing to zero.
    - The funding also covers the industry restructuring fund, Team Australia Automotive, the Automotive Ambassadors, the Automotive Industry Innovation Council and the changed LPG Vehicle Scheme arrangements. These initiatives should commence in 2009.
    - The Green Car Innovation Fund, worth $500 million, should be brought forward to 2009.

- *Option 2*: Funding for the Global Automotive Transition Scheme over the five years to 2015 (inclusive) should be $1.5 billion in capped assistance. An additional tranche of funding of $1 billion in capped assistance should be provided from 2016 to 2020, with this front-loaded and reducing to zero.
  - The funding also covers the industry restructuring fund, Team Australia Automotive, the Automotive Ambassadors, the Automotive Industry Innovation Council and the changed LPG Vehicle Scheme arrangements. These initiatives should commence in 2009.
  - Funding for the Green Car Innovation Fund should be brought forward to 2009 and, if successful, the Fund should be doubled from $500 million to $1 billion and extended beyond its initial five years.
- *Option 3*: Funding for the Global Automotive Transition Scheme over the five years to 2015 (inclusive) should be $1.5 billion in capped assistance. An additional tranche of funding of $1 billion in capped assistance should be provided from 2016 to 2020, with this front-loaded and reducing to zero.
  - A further tranche of funds should be made available to cover the industry restructuring fund, Team Australia Automotive, the Automotive Ambassadors, the Automotive Industry Innovation Council and the changed LPG Vehicle Scheme arrangements. These initiatives should commence in 2009.
  - Funding for the Green Car Innovation Fund should be brought forward to 2009 and, if successful, the Fund should be doubled from $500 million to $1 billion and extended beyond its initial five years.

The Review recommends Option 3.

- Other recommended components of the Global Automotive Transition Scheme are:
  - Funding for both the motor vehicle producers and the supply chain should be split 55 percent (to vehicle producers) and 45 percent (to the supply chain) after monies for the additional programs are either deducted from the capped pool or allocated separate funding.
  - Assistance should be in the form of grants and not duty credits.
  - Credits for the production of vehicles for different markets should be treated the same, by partially uncapping all production credits.
  - The dependency threshold for the component suppliers should be raised to $2 million to facilitate the rationalisation of the industry. Automotive service providers and automotive machine tool producers should continue to meet the lower threshold of $500,000.
  - The loadings applying under the previous Automotive Competitiveness and Investment Scheme for supply chain investment should be abolished.
  - The list of eligible research and development (R&D) activities should be streamlined and exclude payments for recruitment and management.
  - The rate for claims for investment in eligible R&D should be increased from 45 to 50 percent.
  - The rate for claims for investment in plant and equipment should be reduced from 25 to 15 percent.
  - Firms that have not participated in a supply-chain capability development program should participate in such a scheme in return for receiving government assistance. Funding for the program should be provided by the Australian Government with contributing payments from the firms themselves. The supplier capability program should not be limited to participation in Automotive Supplier Excellence Australia, but also include other service providers such as Enterprise Connect, C21 and the motor vehicle producers' supplier capability programs.
- An Automotive Industry Innovation Council should be established, with high level representation from the motor vehicle producers, component suppliers, unions, research and academic organisations, and government.
  - The Automotive Industry Innovation Council should provide advice and oversight in relation to the new transitional arrangements applying to the industry.

- Administrative expenses and secretariat support to the Automotive Industry Innovation Council should be funded under the Global Automotive Transition Scheme.
- The Automotive Industry Innovation Council should include a reference group that provides advice on automotive skills issues to Manufacturing Skills Australia (the Industry Skills Council having primary carriage for manufacturing industry skills development).

Australia's future automotive tariffs (Chapter 11)

- The passenger motor vehicles and parts thereof tariffs should be reduced from 10 to 5 percent on 1 January 2010. This, combined with assistance under the Global Automotive Transition Scheme, will help deliver benefits to the economy as well as continuing to provide transitional support for the industry.

Restructuring the Australian automotive industry (Chapter 9)

- The Australian Government should contribute to a short-term automotive industry restructure fund that aims to assist the Australian automotive supply chain improve economies of scale, enhance management capabilities, internationalise production to build capacity and demand, and enhance long-term sustainability.
  - Funding for the industry restructure fund should be part of the new Global Automotive Transition Scheme.
  - Payments under the industry restructure fund should be determined on a case-by-case basis by the responsible Minister, on advice from his or her department, taking into account 'transmission of business' issues including facilitating mergers and acquisitions in the sector; addressing, where appropriate, contingent liability or other issues that might act as barriers to effective and successful sectoral consolidation; consolidation of plant and equipment; and co-location of production. Where appropriate, fair and reasonable assistance should also be made available to employees made redundant through automotive restructuring.
  - The industry restructure fund should include support for developing the Australian automotive supply chain's management and operational capabilities and processes (similar to Automotive Supplier Excellence Australia, C21 and other existing initiatives).
  - Government funding for the industry restructure fund should be of a limited amount and duration (for example, $60 to $80 million over two years) to cover the immediate restructuring and consolidation needs of the automotive industry.
  - The automotive industry should contribute financially to the activities supported by the industry restructure fund.
- The automotive industry, unions, employees and governments should engage in an ongoing dialogue so that the restructuring and consolidation process is effective in helping with an orderly transition to a more competitive and sustainable future for the industry.
- A memorandum of understanding should be negotiated by motor vehicle producers, component suppliers and unions, and be facilitated by governments where appropriate. The memorandum of understanding should:
  - acknowledge that restructuring and consolidation are a necessary part of assuring a vital Australian automotive industry into the future; and
  - assist with assuring continuity of supply in an industry characterised by just-in-time delivery and high levels of international competition.
- The leadership dialogue between the component sector and unions should continue.
  - Whether this translates into a framework agreement is a matter for the participants. However, there are benefits to be gained from a shared understanding of the challenges that lie ahead and the need for improvements in competitiveness and productivity.
  - The issue of employee entitlements is also a matter where a leadership dialogue can assist the participants to more effectively manage the restructuring process.

- To assist with resolving skills issues common across the automotive and other manufacturing industries, the Australian Government should establish a reference group to provide advice on automotive skills issues to Manufacturing Skills Australia.
  - The reference group should come under the Automotive Industry Innovation Council.

The Green Car Innovation Fund (Chapter 8)

- The Green Car Innovation Fund should assist the Australian automotive industry with developing and commercialising technologies aimed at improving vehicle fuel efficiency and emissions. The combination of the Fund with an emissions trading scheme will drive positive innovation and environmental outcomes for the economy and the industry.
- In preparation for an emissions trading scheme, the start date of the Fund should be brought forward to 2009.
- If the Fund proves successful in its first two years of operation, its funding should be doubled from $500 million to $1 billion and the scheme extended beyond its initial five years.
- Benefits from the Fund should be paid as cash grants, following a competitive selection process based on broad criteria that assess the innovation, technological, commercial and environmental merits of applications.
- Since automotive industry investment is often 'lumpy' there should be scope under the Fund to vary the amount of Fund payments between years.
- There should be scope to vary the one-to-three dollar funding ratio within a range (for example, one-to-two dollars to one-to-four dollars) to take account of varying risk profiles.
- There should be a maximum limit set on the amount of support available to any one funding recipient. This limit should be set at a high level in order not to restrict significant projects.
- Mandatory and discretionary criteria should be designed to assess proposals against a mix of quantitative and qualitative aspects. Commercial application of technology should be a mandatory criterion.
- All organisations and individuals should be eligible, including participants in the automotive supply chain, research organisations, and international firms where eligible activities are performed in Australia.
- Fund eligibility should not be restricted to any particular range of automotive technologies.

Emissions trading and the environment (Chapter 8)

- Road transport (including fuel) should be included in the emissions trading scheme as it allows the industry to determine the lowest-cost form of emissions abatement. In this respect, future consideration of mandatory emissions targets for new vehicles should have regard to development of the emissions trading scheme.
- If the emissions trading scheme excludes road transport, then a mandatory greenhouse gas emissions target should be introduced as a 'second best' policy.
- The grant for liquefied petroleum gas (LPG) units fitted at the time of manufacture of a vehicle under the LPG Vehicle Scheme should be raised from $1,000 to $2,000, provided it facilitates the uptake of new technologies that provide significantly better greenhouse gas emissions outcomes than currently fitted LPG technologies.

Improving access to global markets (Chapter 7)

- The successful conclusion of the World Trade Organization Doha Development Agenda should continue to be a principal focus of Australia's trade negotiations.
- The Review of Australia's Export Policies and Programs should give consideration to ways of addressing beyond-the-border issues such as non-tariff barriers as part of future free trade agreement negotiations.

- Australia should continue to enter into free trade agreement negotiations. However, from an automotive perspective, these should be focused on countries with which Australia can develop its competitive advantage or on countries where very high barriers to trade exist. Economies upon which Australia should focus its free trade agreement negotiations include the Gulf Cooperation Council, the Association of Southeast Asian Nations and South Africa.
- Trade rules, such as rules of origin, should, wherever practicable, be harmonised across free trade agreements to reduce compliance costs to industry.
- A well-known and respected industry figure or figures should undertake an ambassadorial role for the industry.
  - This should be complemented by medium-term funding for the extension of Team Australia Automotive to new and emerging markets, as part of the Global Automotive Transition Scheme.
  - Delivery of the Team Australia Automotive initiative should be through a contestable grant process, and present a united Australian automotive capability (encompassing state government supply chain and export promotion programs) to international markets.

Vehicle safety (Chapter 10)

- Vehicle safety standards should adhere to the Australian Design Rules and be uniform across all states and territories.
- Any changes to vehicle safety standards should also be consistent with Australia's international obligations and not impact on mutual recognition matters (and hence risk market access restrictions for Australian-made vehicles).

Other matters

- Australian governments should continue to include Australian-made vehicles as a major part of their purchasing policies, and should reinforce this through a threshold agreement at the Council of Australian Governments. This should be subject to the local industry continuing to improve greenhouse gas emissions outcomes through the uptake of various emissions abatement technologies. (Chapter 8)
- The Henry Review of taxation should consider the adoption of a new fringe benefits tax statutory rate table that is more evenly spread across the range of kilometres travelled. The new rate table would encourage drivers to use their vehicles only as necessary. (Chapter 8)
- A dialogue between the Australian and affected state and territory governments should occur to ensure that investment incentives are not overly generous and that the benefits exceed the costs of providing such assistance. (Chapter 11)
- States and territories should consider the harmonisation and reduction of stamp duties, vehicle registration and compulsory third-party insurance to facilitate the purchase of new (or newer second-hand) vehicles to help to reduce the average age of the Australian vehicle fleet. This could be through forums such as the Council of Australian Governments or the Council for the Australian Federation. (Chapter 11)

CHAPTER 1:
THE AUSTRALIAN AUTOMOTIVE INDUSTRY

INTRODUCTION

The Australian automotive industry has undergone extensive reform, especially since the Button Plan in 1985, when the industry was protected by quotas and a tariff of 57.5 percent. The removal of quotas and the lowering of protection led to some rationalisation of the industry and made imports more accessible to consumers. These reforms have also made the industry more internationally competitive and export focused. For example, exports of automotive products were around $4.7 billion in 2007, making automotive one of Australia's top 10 export earners (and the largest manufacturing export earner). It also places the automotive sector ahead of more traditional exports such as wine, wheat and wool.

DOMESTIC MARKET

The Australian vehicle market is extremely competitive, with around 60 models of motor vehicles available for purchase. In addition, Australia has one of the most open automotive markets in the world. Table 1.1 shows that in 2005 Australia had the lowest production-to-sales ratio of automotive-producing countries. This is a reflection of the Australian automotive market's low barriers to entry.

Table 1.1. Production and sales of vehicles in selected economies, 2005

Country	Production*	Sales	Production-to-sales ratio (%)
Australia	388,985	988,269	39.4
Brazil	2,528,300	1,631,217	155.0
Canada	2,687,892	1,630,142	164.9
China	5,707,688	5,758,189	99.1
Czech Republic	604,930	175,868	344.0
Germany	5,757,710	3,614,898	159.3
India	1,642,070	1,439,613	114.1
Indonesia	500,710	533,841	93.8
Japan	10,799,659	5,750,750	187.8
Malaysia	563,408	551,042	102.2
Mexico	1,683,913	1,164,048	144.7
Slovakia	218,349	75,033	291.0
Republic of Korea	3,699,350	1,142,562	323.8
South Africa	515,635	564,974	91.3
Thailand	1,125,316	703,432	160.0
United Kingdom	1,803,049	2,825,686	63.8
United States	11,977,457	17,444,329	68.7

* Includes vehicles made for export.
Source: Ward's, *World Motor Vehicle Data* (2006).

Table 1.1 also shows that many high-wage developed economies are net exporters of vehicles and are therefore internationally competitive. High wages and international competitiveness can co-exist, as discussed under 'Manufacturing costs' later in this chapter.

In 2007, the Australian market recorded sales of over one million vehicles for the first time. This was a 45 percent increase in vehicle sales compared to 1997 and a 27 percent increase compared to 2002,[1] and coincided with the increasing affordability of vehicles. Since the mid-1990s, real earnings have increased at a significantly higher rate than vehicle prices.[2] This has meant that since 1995 the affordability index for motor vehicles (average weekly earnings divided by the consumer price index for motor vehicles) has increased by 84.8 points.[3] Another measure of increasing affordability is that 'family 6 cars' (Holden and Ford six-cylinder base models) now take 31.9 average weeks' earnings to pay off, compared to 41.6 weeks in 1995.[4]

Although vehicle affordability has risen, the operating costs of passenger vehicles have increased dramatically in the past few years. Since 2002 there has been a 400 percent increase in the price of oil, from US$25 per barrel to US$100 per barrel.[5] This has contributed to a 33 percent increase in the price of petrol in Australia since 2004.[6] In 2003–04, fuel accounted for 24 percent of an Australian household's transport costs, behind motor vehicle purchases (36 percent), but ahead of registration/insurance (17 percent), other charges (13 percent), spare parts (5 percent), public transport (3 percent) and fares and freight (2 percent).[7] It would be expected that the proportion of a household's transport costs accounted for by fuel would have increased, as the price of petrol has increased at a far greater rate than household income. However, the rise in the price of fuel has been cushioned by the appreciation in the Australian dollar.

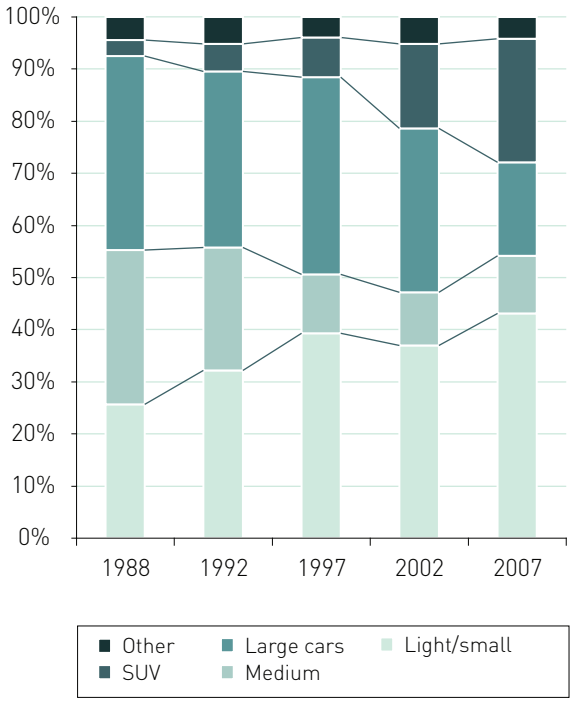
Shift in consumer preferences

There has been a significant change in the type of vehicles demanded by consumers.[8] Traditionally, the Australian vehicle market has been dominated by large passenger cars and variants (for example, Holden Commodore and Ford Falcon) and large medium vehicles (such as the Toyota Aurion and Camry). There has been a recent trend towards smaller, lower fuel consumption vehicles (such as the Toyota Yaris and Corolla), luxury cars (such as Mercedes Benz and BMW) and sports utility vehicles (SUVs) (which range in size from the Suzuki Vitara and Toyota RAV4 through to the Hummer). There has been a significant sales substitution from large Australian-made vehicles to SUVs, even though SUVs are generally less fuel efficient. These trends have impacted on local vehicle producers—the market share of Australian motor vehicle producers (MVPs) fell from 30 percent in 2002 to 19 percent in 2007. This fall continued through the first several months of 2008, and was 17 percent in May 2008.

In addition, while the Australian automotive industry continues to dominate sales in the large and medium car market, the domestic manufacturers' share of this market has fallen—from 95 percent in 2002 to 88 percent in 2007. These trends are shown in Figures 1.1 and 1.2.

Sales of Australian-made vehicles are largely dependent on private and government fleet sales. Less than one-quarter of Australian-made vehicle sales in 2007 were to private buyers. There is also a growing level of sales to the business sector. In 2007, sales to this sector amounted to 113,807, or nearly 56 percent of total Australian-made vehicle purchases (Figure 1.3). In the same year, governments across various tiers purchased 37,073 (or 19 percent) of Australian-made vehicles (Figure 1.4).

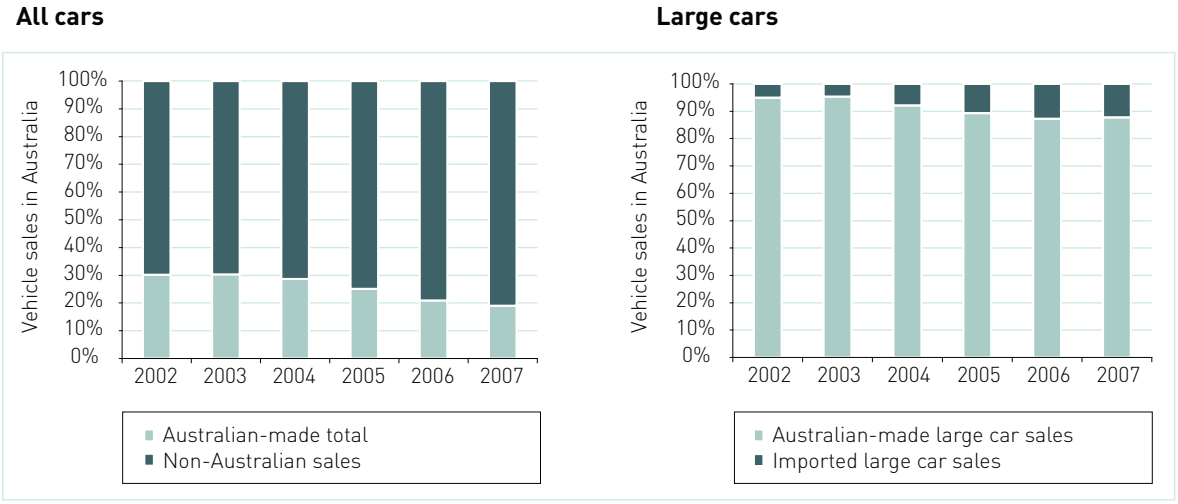
Figure 1.1. Vehicle sales, by vehicle type, Australia, 1998–2007



Source: Federal Chamber of Automotive Industries, *VFacts*.

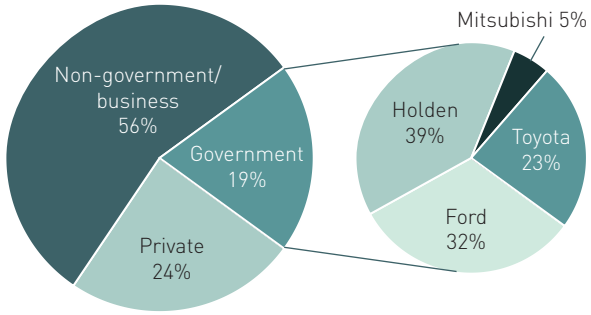
1 Federal Chamber of Automotive Industries, *VFacts*, FCAI, 2007.
2 Australian Automotive Intelligence, *Australian Automotive Intelligence Yearbook 2008*, 7th edn, Richard Johns, 2008, p. 55.
3 ibid., p. 56.
4 ibid.
5 From the mid-1980s through to 2002, the inflation-adjusted price of oil was generally under US$25 a barrel.
6 FCAI, *Submission to the 2008 Automotive Review*, p. 21.
7 Australian Bureau of Statistics, *Household Expenditure Survey, Australia, Detailed Expenditure Items, 2003–04*, cat. no. 6535.0 ABS, Canberra, 2006.
8 Federal Chamber of Automotive Industries, op. cit.

Figure 1.2. Australian-made sales and total sales Australia (all cars and large cars), 2002–2007



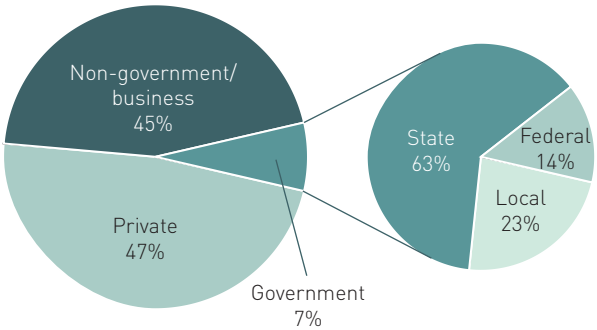
Source: Federal Chamber of Automotive Industries, *VFacts*.

Figure 1.3. Australian-made vehicle sales, by type of sale; and government sales by MVP, 2007



Source: Federal Chamber of Automotive Industries, *VFacts*.

Figure 1.4. Total Australian sales, by type of sale; and government sales by tier of government, 2007



Source: Federal Chamber of Automotive Industries, *VFacts*.

DOMESTIC PRODUCTION

The Australian automotive industry encompasses a wide range of activities including vehicle production, component production, tooling and design and engineering. It is an important part of the Australian economy, employing over 64,000 people[9] and accounting for almost 6 percent of manufacturing employment. Value added to the sector totals more than $5.6 billion,[10] representing 5.6 percent of the manufacturing sector's industry value added and 0.6 percent of national gross domestic product (GDP). In its submission to the Review, Ford Australia noted that Australia is one of only 15 countries that can take a car from concept all the way to full production.[11]

There are three MVPs in Australia—GM Holden, Ford Motor Company of Australia and Toyota Motor Corporation Australia. All three companies are fully owned subsidiaries of major overseas producers. Mitsubishi Motors Australia ceased its Australian production in March 2008, although it remains in the market as an importer of a full range of vehicles.

Motor vehicle production takes place in Victoria and South Australia. Ford has an assembly plant in Broadmeadows (Melbourne) and a component and engine plant in Geelong. GM Holden manufactures vehicles in Elizabeth (Adelaide), and produces V6 engines at its Fishermans Bend (Melbourne) facility. The V6 engine is supplied to both the domestic

9 Australian Bureau of Statistics, *Labour Force, Australia, Detailed, Quarterly*, cat. no. 6291.0.55.003, ABS, Canberra, 2008.
10 Australian Bureau of Statistics, *Manufacturing Industry, Australia*, 2005–06, cat. no. 8221.0, ABS, Canberra, 2008.
11 Ford Australia, *Submission to the 2008 Automotive Review*, 2008, p. 3.

market, for inclusion in GM Holden's range of locally manufactured vehicles, and to a number of export markets. Toyota manufactures vehicles and four-cylinder engines in Altona (Melbourne).

All three MVPs have R&D capability within Australia. GM Holden has a regional design and engineering centre in Australia that employs around 1,000 staff and is involved in GM's global product development. Toyota's regional technical centre employs around 100 staff and also contributes to Toyota's global platforms. Ford Australia has established a design and engineering 'Centre of Excellence' which is responsible for several projects, including a global pick-up truck platform. Ford Australia's product development program employs over 1,300 staff.

In addition, there are over 200 firms—predominantly based in Melbourne and Adelaide—producing automotive components for the vehicle manufacturers. The Australian automotive industry also has access to specialised tooling services from around 500 firms.

In 2007, production of Australian vehicles numbered 327,984, a drop of 5 percent from 2000.[12] In global terms, this level of production is relatively small, accounting for less than 0.5 percent of world production. Competing against countries with major production-scale advantages presents a difficult challenge for the industry. On the other hand, Australia's relatively small scale of production means that the industry is generally more flexible in respect of changes in demand, more efficient in servicing niche markets, and more cost-effective in smaller production runs.

The quality of Australian-produced vehicles can be measured by the number of faults per vehicle. Australian vehicles such as the Holden Commodore (1.2 faults per vehicle) and the Ford Falcon (1.0 fault per vehicle) were slightly above the average for large cars (0.8 fault per vehicle) in 2006. Both cars recorded a reducing incidence of faults over the last few years. The Toyota Aurion had an average of only 0.7 fault per vehicle, which is below the industry average.[13]

Australian MVPs are heavily reliant on Australian inputs. In 2006, MVPs sourced 75 percent of their components—worth $4.6 billion—from Australian component producers.[14] Similarly, Australian component producers are heavily reliant on domestic sales—81 percent of total sales are made domestically.[15]

12 FCAI, 2008, http://www.fcai.com.au/volumes
13 Department of Innovation, Industry, Science and Research, *Key Automotive Statistics 2007*, DIISR, Canberra, 2008, p. 22.
14 ibid.
15 ibid.

Trends that have developed in the last few years have challenged the link between domestic MVPs and component producers. First, due to the rise of global platforms MVPs are more commonly sourcing components from overseas. These global supply chains are becoming increasingly integrated, and since 1994 Australian component imports have increased by 74 percent.[16] Second, MVPs are generally only awarding short-term components contracts, thereby undermining the financial security of many component producers.[17] As a result, many component producers are moving their operations overseas or reducing their reliance on domestic sales. For example, in 1994, 90 percent of component producers' sales were derived from the domestic market. This had fallen to 81 percent of sales by 2007.

Truck and bus sector

There are currently three assemblers of trucks in Australia: Iveco (Wacol, Queensland), Kenworth (Bayswater, Victoria) and Volvo Commercial Vehicles (which assembles both Mack and Volvo trucks in Dandenong, Victoria). These three plants produce over 50 percent of heavy-duty truck chassis sold in Australia.[18] There is also a secondary manufacturing process which involves fitting equipment to truck chassis as required by the final operator. There are many manufacturers, ranging from small firms to the truck chassis assemblers, involved in this secondary manufacturing process. These manufacturers and assemblers are heavily reliant on the skills and expertise of the Australian automotive component sector. Without this skill base, the truck manufacturing industry would struggle to manufacture locally, which could be detrimental to other important sectors such as transport and resources.

It is estimated that the truck manufacturing industry employs about 2,350 people in chassis manufacturing and about 7,600 in 'secondary' manufacturing.[19]

Like the car industry, the Australian heavy commercial vehicle industry was rationalised in the 1980s and 1990s as government protection was reduced. The general tariff of 5 percent now applies to all heavy commercial vehicle imports.

16 Department of Innovation, Industry, Science and Research, op. cit.
17 House of Representatives Standing Committee on Employment, Workplace Relations and Workforce Participation, *Shifting Gears: Employment in the Automotive Components Manufacturing Industry*, HRSCEWR, Canberra, 2006, p. 13.
18 Truck Industry Council, *Submission to the 2008 Automotive Review*, p. 1.
19 ibid., p. 2.

Aftermarket manufacturing sector

This sector manufactures a range of automotive parts and accessories for the independent automotive aftermarket (parts and accessories distributed through networks external to MVP networks) and the original equipment automotive aftermarket (parts and accessories distributed through MVPs and their dealers' networks).[20]

The automotive aftermarket manufacturing sector is a significant contributor to the automotive sector, employing around 30,000 people.[21] The sector is also a significant exporter—around 170 manufacturers are now involved in direct export, technology licensing and international joint ventures worth an estimated $600 million per annum.[22]

Retail, service and repair sectors

Although not directly involved in manufacturing, the automotive retail sector plays the significant role of selling, distributing and servicing both imported and Australian-manufactured motor vehicles. Understanding the importance of this role, MVPs also undertake significant capital investments in their dealer networks. At December 2006, there were over 1,299 dealers in Australia with over 52,000 employees.[23]

The automotive repair and service sector is also a major part of the Australian automotive industry. More than 25,596 businesses were registered at the end of the 2007–08 financial year,[24] and as at February 2008 the sector employed a total of 135,335 people.[25]

Advanced manufacturing industry

The advanced manufacturing industry provides design, tooling, manufacturing technology and equipment to the automotive sector as well as to the broader manufacturing sector. As such, it is seen to play an 'enabling role' within the Australian economy. In 2004, the industry was worth $2.84 billion annually and directly employed 12,000 people.[26]

20 Australian Automotive Aftermarket Association, *Submission to the 2008 Automotive Review*, p. 6. Note that 45 percent of AAAA members produce for the aftermarket and the original equipment market while the remaining 55 percent of members supply only to the aftermarket.
21 Based on total AAAA membership.
22 AAAA, loc. cit., p. 5.
23 Motor Trades Association of Australia, *MotorData*©, MTAA, Canberra, 2008.
24 Australian Bureau of Statistics, *Counts of Australian Businesses, including Entries and Exits*, cat. no. 8165.0, ABS, Canberra, 2008. This figure incorporates the 'Automotive Repair and Services n.e.c.' industry subdivision.
25 Australian Bureau of Statistics, *Labour Force, Australia, Detailed, Quarterly*, cat no. 6291.0, ABS, Canberra, 2008.
26 Advanced Manufacturing Australia, *Submission to the 2008 Automotive Review*, p. 5.
27 Department of Innovation, Industry, Science and Research, op. cit.
28 Denso, *Submission to the 2008 Automotive Review*, pp. 7–8.
29 Robert Bosch, *Submission to the 2008 Automotive Review*, p. 11.

PROFITABILITY[27]

In 2007, trading losses in vehicle manufacturing for the MVPs totalled $722 million, or an 8.6 percent loss on sales. This was somewhat offset by MVPs' sales of components and other business, with net losses on all MVP activities totalling $449 million. This situation can be compared to that of a decade earlier, when net trading profits for the MVPs totalled $518 million, including $344 million in profits on vehicle manufacturing. Justifying domestic production with such large trading losses presents a major challenge to the Australian MVPs. However, the 2007 figures also include the losses of Mitsubishi, which has since exited the market, as well as costs associated with the development of new models by the remaining three producers. It should be noted that profits are also falling in a number of other automotive-producing economies, including some of the major ones. The global downward trend in profits is discussed in more detail in Chapter 3.

There is also evidence that component producers are having their profit margins reduced as the competitiveness of imports increases. This is due, in part, to the strong Australian dollar and to the standard global platforms that allow MVPs to increase import substitution of components. Cost-down pressures from the MVPs, as well as rising input costs, have also served to reduce margins.

MANUFACTURING COSTS

The cost of manufacturing in Australia is rising and is a major concern for many automotive manufacturing firms. Production inputs such as labour, materials, energy, water and logistics feed into the cost structures of all manufacturers. Component producer Denso conducted a study of the 'on-costs' of operating in Australia compared to its equivalent operations in Thailand. The study found that operating in Australia (as opposed to Thailand) amounted to a cost penalty of around 48 percent. After factoring in an electricity price rise, the penalty increased to 69 percent.[28] Bosch notes that logistics is a major increasing cost for its business, especially since logistics amounts to about 3 to 4 percent of total costs.[29]

In terms of international comparative labour costs (viewed in isolation from technological capacity and total factor productivity), the Australian automotive industry's labour costs are below those in developed economies but above those in developing economies that have major automotive investments. As shown in Table 1.2, wage costs in Australia are much less than in Germany and the United States, but similar to levels in Japan. Labour costs in automotive-producing countries such as the Republic of Korea, Taiwan and Mexico were significantly lower than in Australia.

Table 1.2. Hourly compensation costs for motor vehicle and parts production workers (in US dollars)

	1999	2002	2005
Germany*	$34.28	$32.21	$44.95
United States	$26.98	$32.49	$35.57
United Kingdom	$20.35	$21.23	$29.27
Japan*	$26.06	$24.23	$27.12
Australia	$16.59	$15.96	$25.96
Republic of Korea*	$9.57	$12.33	$16.61
Taiwan	$7.71	$7.05	$7.75
Mexico*	$2.46	$3.46	$3.52

* Denotes net exporters.
Source: US Department of Labor, Bureau of Labor Statistics (12 May 2008).

Of course, with regard to labour costs at least, the comparative data presented in Table 1.2 do not take into account Australia's technological and skill advantages, as well as advanced design and engineering capabilities, vis-à-vis its low-wage competitors. In addition, Australia imports vehicles and components from higher wage countries such as Germany, the United States and Japan.

Still, countries such as China and India are seeking to 'move up the value chain' by upgrading their technological and research infrastructure. The implication is that the Australian industry must continue to improve its international benchmark performance in regard to manufacturing costs. In addition, in its submission to the Review, GM Holden noted that, "In the key area of support for R&D, Australia is lagging behind other developed countries".[30] Given that innovation and productivity growth are keys to a competitive and sustainable industry in the future, Australia-based MVPs and the supply chain should strive to improve their performance against both emerging and established competitors. Labour productivity trends are discussed in Chapter 9.

30 GM Holden, *Submission to the 2008 Automotive Review*, p. 36.

TRADE

The export of automotive products is of growing significance to the Australian economy—amounting to $4.7 billion in 2007.[31] This makes the automotive sector one of Australia's top 10 export earners and the largest manufacturing export earner (with 10.7 percent of total manufacturing exports in 2007). It also places the automotive sector ahead of more traditional exports such as wine, wheat and wool. The growth in Australia's automotive exports has occurred despite the large reductions in domestic automotive tariffs since the 1980s.

The importance of improving access to markets and the impact of investment and location decisions on export performance are discussed elsewhere in this report. As noted, these factors can be influenced by head office decisions over export and import strategies, co-location to achieve proximity to major assemblers and trade barriers.

In addition, current trade data are based on gross values and do not reflect the Australian-only value of components and parts in automotive goods. As such, the trade data include exports of imported components and parts that have gone into the manufacture of automotive goods.

Imports

The Australian automotive industry operates in an increasingly competitive global environment. It faces competition from traditional automotive producers such as Japan, the European Union and the United States, and from Asian economies such as Thailand, China and the Republic of Korea. Australia is also one of the most open automotive markets in the world. Of the major automotive-producing countries, only the United States, Canada, Japan and the Republic of Korea have more open markets in terms of the level of applied tariffs on automotive products (see Table 5.1 in Chapter 5). The European Union applies a 10 percent tariff on automotive imports.

Imports have increased significantly over the last few years from $18 billion in 2002 to $27 billion in 2007, an increase of 47 percent. This increase came largely from a 61 percent increase in vehicle imports between 2002 and 2007.

Australia's major source of imports remains Japan (36 percent of vehicle and parts imports), followed by Thailand (12 percent), the United States (12 percent),

31 Department of Foreign Affairs and Trade, *STARS Database*, DFAT, Canberra, 2008.

Germany (9 percent) and the Republic of Korea (6 percent). The largest import growth has been from Thailand, which increased by $2.1 billion between 2002 and 2007. Some of this can be attributed to the Thailand–Australia free trade agreement, which allows duty-free entry of Thai-manufactured vehicles into Australia.

Exports

In 2007, total automotive exports from Australia amounted to $4.7 billion, which places the industry in the top 10 export earners and ahead of more traditional exports such as wheat and wool. Of this, over $2.9 billion came from the export of motor vehicles, and $1.7 billion came from the direct export of automotive components,[32] that is, components not incorporated into complete vehicle exports.

Australian MVPs have become increasingly focused on export markets. The Australian motor vehicle market is relatively small, and MVPs are facing difficulty in achieving scale economies solely on the strength of domestic sales. In 1997, only 16 percent of local production of Australian motor vehicles was sold overseas. By 2007, this figure had increased to 42 percent.[33]

Since 2002, automotive exports have fallen by $79 million to $4.7 billion. This can be partly explained by the appreciation of the Australian dollar, which has lessened the Australian dollar value of exports where contracts are denominated in US dollars. However, this exchange rate effect has been partly offset by increases in efficiencies in the automotive industry. This can be seen by the fact that, while the Australian dollar has appreciated by 53 percent since 2002, automotive exports have fallen by only 4.6 percent over the same period.

Given the high—but, for some models, declining—local content in Australian-made cars, and the dependence of component producers on sales to domestic MVPs, exports of vehicles are very important to the component sector.

In the past few years, the Middle East has emerged as Australia's main export market. There is significant potential for growth in this region, given its high level of demand for large cars such as the Toyota Camry and Holden Commodore (badged as the Chevrolet Lumina). Australian vehicles are also growing in popularity in terms of fleet sales. Taxi fleets in the region have a preference for the Australian-produced Toyota Camry, and the Saudi Arabian police force has a preference for Holden Commodores. The demographics in the region also suggest that the market will continue to grow—the median age in Saudi Arabia is around 21 years. It is also expected that women will be granted the right to drive by the end of 2008, which will potentially increase the size of the automotive market.

Exports to Saudi Arabia, the United Arab Emirates, Kuwait, Oman, Qatar and Bahrain amounted to $2.2 billion in 2007, or 46 percent of total automotive exports (and 75 percent of vehicle exports), an increase of 19 percent since 2002. Australia's largest single trading partner is Saudi Arabia, with automotive sales of $1.2 billion in 2007. This dependence on the Middle East market is a concern for the industry, especially with growing competition from nations that enjoy scale and geographic advantages over Australia. In addition, US-sourced vehicles enter the Gulf States duty-free due to free trade agreement provisions.

Other major automotive export markets include New Zealand (16 percent), the Republic of Korea (9 percent) and the United States (9 percent). Automotive exports to the United States decreased by 64.6 percent from 2002 to 2007, falling from $1.1 billion to $394 million. This could be partly due to the rising Australian dollar and the fall in the US market share of the US-owned and -based automotive companies. However, early sales of the Australian Holden G8 vehicle to the United States have been strong, and GM Holden forecasts a volume of around 30,000 units to be produced for the US market in 2008.[34]

The export of design and engineering services is becoming increasingly important for the Australian industry. While submissions to the Review did not report on the income earned from such activities, Australia-based GM Holden is responsible for the design and engineering of rear-wheel-drive products for Australia and GM brands globally, Ford Australia is the design and engineering centre of excellence for the Asia–Pacific and Africa regions for its parent company, while Toyota Australia is one of two technical centres for Toyota Motor Corporation in the Asia–Pacific region and one of its five technical centres globally. In addition, firms in the supply chain are also earning export revenue through design, engineering, and returns on intellectual property, as well as repatriating profits from overseas operations.

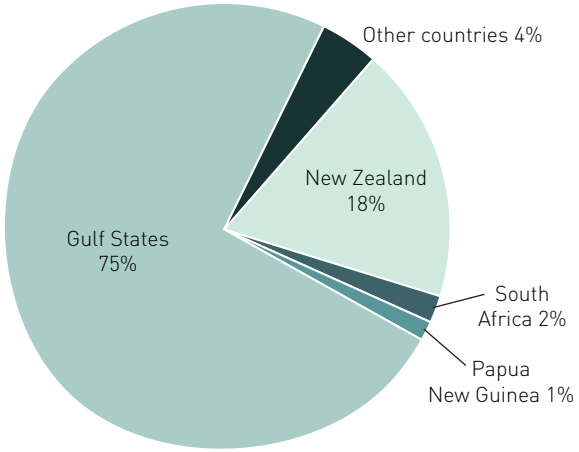
Figures 1.5 to 1.8 below, and Appendix A, provide further detail on Australia's trade in automotive products.

32 ibid.

33 Department of Innovation, Industry, Science and Research, op. cit., p. 21.

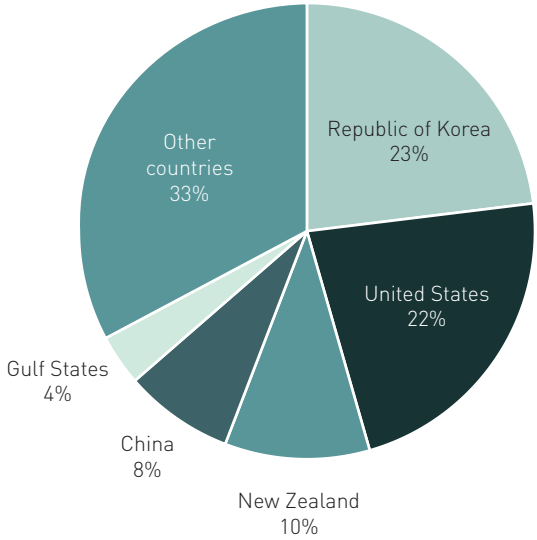
34 GM Holden, op. cit., p. 24.

Figure 1.5. Vehicle exports: Australia's major trading partners, 2007



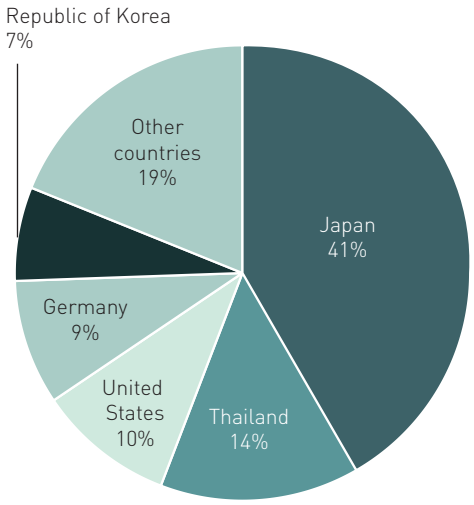
Source: Department of Foreign Affairs and Trade, *STARS Database* (2007).

Figure 1.6. Component exports: Australia's major trading partners, 2007



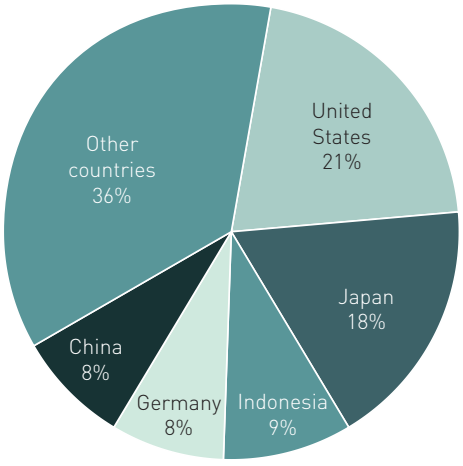
Source: Department of Foreign Affairs and Trade, *STARS Database* (2007).

Figure 1.7. Vehicle imports: Australia's major trading partners, 2007



Source: Department of Foreign Affairs and Trade, *STARS Database* (2007).

Figure 1.8. Component imports: Australia's major trading partners, 2007



Source: Department of Foreign Affairs and Trade, *STARS Database* (2007).

SUMMARY OF FINDINGS

- Australia has one of the most open automotive markets in the world.
- Australian motor vehicle and component producers have become increasingly focused on export markets. The automotive industry is among Australia's top 10 exporters, ahead of traditional industries such as wine, wheat and wool.
- There has been a shift in consumer preference towards smaller, lower fuel consumption vehicles and SUVs (which are seen as a substitute for the family car). This has adversely affected the local vehicle assemblers, which produce in the large car segment, despite the fact that SUVs are generally not as fuel efficient as the Australian-made large vehicles.
- The automotive industry is an important part of the Australian economy, employing over 64,000 people and accounting for almost 6 percent of manufacturing employment. Value added for the sector totals more than $5.6 billion, representing 5.6 percent of the manufacturing sector's industry value added and 0.6 percent of national gross domestic product.
- Falling profitability levels of the local MVPs presents a major challenge to the local industry. In 2007, trading losses in vehicle manufacturing for MVPs were $722 million, or an 8.6 percent loss on sales.

CHAPTER 2:
OUTLOOK FOR THE AUSTRALIAN AUTOMOTIVE INDUSTRY

INTRODUCTION

The competitive environment facing the Australian automotive industry has changed substantially since the completion of the previous vehicle industry review in December 2002. The industry now faces a strong and rising Australian dollar, rising input costs (particularly for raw materials), an increasingly competitive global automotive market, environmental concerns, rising oil prices, and changing consumer preferences in a movement away from large Australian-produced vehicles. The local industry needs to take advantage of a range of opportunities, including the consumer shift toward new fuel and drivetrain technologies and the dramatic growth in emerging international vehicle markets.

The industry also has opportunities to compete in various segments of the automotive design and manufacturing process, not only in relation to the export of automotive goods but also in relation to the export of R&D and design, licensing of IP, relocation, and the repatriation of profits from foreign direct investment.

OPPORTUNITIES FOR THE AUSTRALIAN AUTOMOTIVE INDUSTRY

Export opportunities in established and emerging markets

The local market is relatively small and expansion into overseas markets is important for increased sales and production and scale economies. This expansion also helps underpin the industry's sustainability.

Emerging markets such as China, Russia and India present major opportunities for motor vehicle producers (MVPs) and component suppliers. The automotive industries in these economies are still developing and this presents an opportunity for the Australian automotive industry, which includes established component producers and has advanced design and tooling capabilities. However, Futuris and a range of other companies noted in their Automotive Review 2008 submissions that tariff and non-tariff barriers present a major obstacle in many of these countries (this is discussed further in Chapter 7).

Trade to established markets such as the United States and the Middle East still presents MVPs and component producers with opportunities for growth. Toyota has established a strong market in the Middle East, particularly in Saudi Arabia. Toyota exports around 95,000 vehicles a year and sales to fleet, taxi and government bodies in these countries are particularly strong. In addition, GM Holden has opened up an entirely new market segment, and will begin exporting the Holden utility to the United States from 2009.

There is also potential to export to emerging markets in the Middle East and North Africa, including Libya. The growth in tourism in Libya presents opportunities for Australia to supply to the taxi fleet market in the region.

Increasing global supply chain integration

The Australian automotive industry is competing in an increasingly integrated global market. Cost pressures have meant that global platforms, that is

the use of common vehicle designs across different production locations, have become the industry standard. This phenomenon presents opportunities for component suppliers to become more integrated into global supply chains and to diversify and invest in foreign markets. It can also be a threat, in that the local supply chain faces increasing competition from imports used to manufacture local vehicles and major components.

A complete industry

Australia is one of only 15 countries with the capability to take a car from concept all the way to full production. This capability encompasses strong skill sets in R&D, design, engineering, product and process development and advanced manufacturing. This means that for a small country, Australia can produce vehicles and components, and for a world market provide design and engineering services (and a world market can produce automotive goods and services for Australia).

This also provides Australian firms with an advantage when competing against countries which may lack a complete industry and which therefore must find a niche role in global automotive production. On the other hand, opportunities available to the industry are under pressure from emerging economies such as China and India, which are moving up the value chain and are actively developing the full spectrum of capabilities needed to host a complete industry.

Proximity to Asia

Asian countries, particularly China and India, are expected to be major contributors to growth in global light vehicle production. Australia is well located to be able to take advantage of this, especially if trade barriers are removed or reduced. On the other hand, the growth in automotive capacity in these economies is likely to be a threat in the Australian market and in markets in which Australia competes.

Creating a market niche in emerging alternative fuel and drivetrain technologies

The shift of consumer preferences towards vehicles with low fuel consumption presents an opportunity for Australia's MVPs to find a niche market for such products in the medium to large car segment. For MVPs and the supply chain, the opportunities range from the production of hybrids and alternative fuel vehicles (such as liquefied petroleum gas (LPG) and clean diesel) through to the development, adoption and uptake of current drivetrain technologies such as cylinder deactivation, variable valve timing and actuation, spark ignition direct injection, regulated voltage control, variable displacement, air-conditioning compressor and electric power steering.

CHALLENGES

Maintaining and expanding the Middle East market

The Australian automotive industry is heavily dependent on export sales to the Middle East, which account for three-quarters of vehicle exports and nearly half of the value of all automotive exports. Threats to this market include competition from imports from economies such as China, India and Thailand. There is also a real danger that this market may shift towards small cars as has occurred domestically. However, the Middle East market also constitutes a potential growth opportunity for Australian-made vehicles. The maintenance and expansion of this market are dependent upon the export strategies of the parents of Australian MVPs. These and other market access issues are discussed in Chapter 7.

Changing consumer preferences

There has been a significant change in the type of vehicles demanded by Australian consumers.[1] Traditionally, the Australian vehicle market has been dominated by large passenger cars and their variants. There has been a trend in Australia and internationally towards smaller, lower fuel consumption vehicles, sports utility vehicles (SUVs) and luxury cars. This trend has recently accelerated, and impacted on local vehicle producers, with the market share of Australian MVPs falling from 30 percent in 2002 to 19 percent in 2007.

More specifically, since 2002, domestic sales of new Australian-made vehicles have decreased for GM Holden (by 33 percent), Ford (by 10.5 percent), and Mitsubishi (by 53 percent). Only sales of Australian-made Toyota vehicles have increased since 2002—by 22 percent to 2007. This trend has continued into the first two months of 2008, with sales of Australian-made vehicles continuing to fall.

Nonetheless, there are early encouraging signs that Australian MVPs are responding to the changing market circumstances. For example, Ford has announced plans to manufacture the four-cylinder Focus in Australia from 2011, and Toyota plans to build the Camry hybrid locally from 2010.

1 Federal Chamber of Automotive Industries, *VFacts*, FCAI, 2007.

Greenhouse emissions

The automotive industry is considering ways to improve fuel consumption and reduce greenhouse emissions. These plans are closely intertwined with efforts to develop new fuel efficient technologies and vehicles, such as the Camry hybrid due in 2010. The MVPs note that implementing these changes to increase fuel efficiency and reducing emissions is extremely costly and requires large capital investments.

The Garnaut Climate Change Review's draft report recommended that a domestic emissions trading scheme should include road transport.[2] This would increase the price paid by consumers for fuels such as petrol and diesel, and be a challenge for the Australian industry, which currently produces large cars with relatively large engine capacities.

On 16 July 2008, the Australian Government released its green paper on the Carbon Pollution Reduction Scheme, which is intended to be implemented in 2010. At the heart of the scheme is emissions trading. The scheme will cover transport. To "offset the initial price impact on fuel associated with the introduction of the Carbon Pollution Reduction Scheme, the Government will cut fuel taxes on a cent for cent basis". The Government also intends to provide transitional assistance in the form of a share of free permits to the most emissions-intensive, trade-exposed industries.[3]

Profitability

As discussed in Chapter 1, the profitability levels of the local MVPs are falling. There is also evidence component producers' profit margins are declining, which could signal further rationalisations in the industry.

The rising Australian dollar

The strength of the Australian dollar, especially in relation to the US dollar and the Japanese yen, has had a major negative effect on the competitiveness of the Australian automotive industry. For the export sector, the key exchange rate is the US dollar, both because most contracts are denominated in this currency and because major markets for the industry, such as the US and Gulf Cooperation Council, are linked to the US dollar.[4] For automotive imports, the value of the Japanese yen is particularly important, since most vehicles are imported from Japan and are paid for with yen.

From January 2002 to January 2008, the value of the Australian dollar appreciated 77 percent against the US dollar, 40 percent against the Japanese yen, 27 percent against the Korean won and 36 percent on a trade-weighted basis.[5]

This has led to Australian vehicles becoming relatively more expensive compared to their import competition. The new car price index, which measures the average retail prices of vehicles, has increased by 9 percent since 2001 for Australian automobiles.[6] However, over the same period, the price index of all imported vehicles dropped by 2 percent, and for Japanese vehicles fell by 4 percent. The rising Australian dollar also impacts on exporters, as many contracts use US dollars.

On the other hand, MVPs and some component producers have a natural hedge against the rising Australian dollar, as they import inputs to production. In addition, the appreciation of the Australian dollar has reduced the cost of imported capital equipment required for upgrading and expanding capacity.

The Productivity Commission's economic modelling shows that the effects of changes in automotive assistance on the industry, and indeed the economy, would be very small relative to other influences on the industry, in particular exchange rate movements. For example, a further appreciation of the Australian dollar, induced by an ongoing commodity boom, is projected to lead to a significant contraction in the automotive industry. This contradiction would be far greater than one resulting from reducing tariffs, and would also lead to a contraction in several other industries. Moreover, a future decrease in the exchange rate of comparable magnitude—resulting, for example, from a reduction in commodity prices—would see an expansion that would more than offset the modelled effects of reductions in assistance.[7] This assumes, of course, that a significant contraction in the automotive sector does not lead to diseconomies of scale and the exit of many firms that would not re-enter the Australian manufacturing sector.

2 Garnaut, R, *Garnaut Climate Change Review. Draft Report*, Commonwealth of Australia, Canberra, 2008, p. 368.

3 Wong, P (Minister for Climate Change), *Green Paper on Carbon Pollution Reduction Scheme Released*, media release, PW 117/08, 16 July 2008.

4 DFAT, *Submission to the 2008 Automotive Review*, p. 13.

5 Reserve Bank of Australia, *Historical Exchange Rates*, 2008, www.rba.gov.au/statistics/historicalexchangerates

6 Australian Automotive Intelligence, *Australian Automotive Intelligence Yearbook 2008*, 7th edn, Richard Johns, 2008.

7 Productivity Commission, *Modelling Economy-wide Effects of Future Automotive Assistance. Research Report*, PC, Canberra, 2008, p. 61.

Small scale

A number of new global automotive assembly plants have recently opened, each with a minimum production capacity of 300,000 units per annum. This figure is close to the entire Australian annual production. It is generally accepted that a minimum plant capacity of 300,000 to 400,000 units per annum is necessary to help ensure profitability for some small and medium size car production where margins are low. Australia does not have the domestic market size to justify such a scale of production. This further highlights the importance of exports in helping boost production and economies of scale.

On the other hand, the relatively small scale of production in Australia allows significant flexibility based on niche production and significant scope to ramp up or reduce production in line with market demand. For example, the small scale can enable firms to respond more flexibly to changing circumstances, such as rising demand for more fuel-efficient vehicles. It is much harder for larger capacity plants to retool for small volumes.

Fragmented component sector

The Australian component manufacturing sector is fragmented, with many small firms operating in the industry. A fragmented component industry does not produce on a sufficient scale to be globally competitive. Furthermore, smaller firms do not have access to the global technologies available to the larger multinational Tier 1 firms, are not as competitive as larger Tier 1 firms, and lack skills particularly in terms of management and manufacturing quality.[8] These inefficiencies impact on the entire automotive industry and are discussed further in Chapter 9.

Discontinuity of supply

A range of factors, including those listed above, have impacted heavily on Australian component manufacturers, especially smaller firms operating at the margin. As a result, a number of smaller component producers have closed in the past few years, and it is estimated that 7,135 jobs have been lost in the automotive component sector between 2002 and 2006.[9] This discontinuity in component supply affects the entire automotive industry production chain, given the importance of just-in-time production. As discussed in Chapter 9, this imposes a number of costs, including supply breakdowns. It also has costs associated with MVPs and Tier 1 companies having to find alternative suppliers, costs to workers, and costs to the reputation of the Australian industry, including in export markets. Furthermore, it flows through to and impacts on the reputation of the Australian manufacturing sector as a whole. An actual or perceived inability of the automotive industry supply chain to provide continuity of supply has the potential to diminish the attractiveness of Australia as an investment location.

Competition for investment

Many of the Australian MVPs and Tier 1 component manufacturers are part of global organisations and compete for investment funds with other foreign subsidiaries. Many of these firms noted in their submissions to the Review that it is becoming increasingly difficult to attract investment funds having competing subsidiaries from nations with lower cost structures (in terms of overheads and labour), more government support programs, greater trade protection and greater advantages of scale. In part, these developments reflect the change in the Australian dollar exchange rate over the last several years.

This has implications for the supply chain, which is reliant on domestic production of vehicles and which supplies Tier 1 companies. For example, the Australian tooling industry is heavily reliant on capital investment by MVPs and the components sector in plant and equipment, such as assembly and subassembly lines. This investment is 'lumpy' in nature and centred around new model launches. The tooling industry is also facing increased competition from imports of basic tools, particularly from China and India.

Several MVPs and Tier 1 component manufacturers noted the importance of the Automotive Competitiveness and Investment Scheme (ACIS) in attracting investment in their Review submissions. For example, GM Holden reported that "ACIS combined with other government incentive schemes has provided support for large-scale capital investment in Australia including the High-Feature V6 Engine plant at Fisherman's Bend, and the new VE Commodore".[10]

Reliance of the component producers and the tooling industry on domestic MVPs

The component producers and the tooling industry are very reliant on domestic MVPs for sales. The component producers rely on the MVPs to assemble

8 Australian Automotive Intelligence, op. cit., p. 45.
9 FAPM, *Submission to the 2008 Automotive Review*, p. 53.
10 GM Holden, *Submission to the 2008 Automotive Review*, p. 40.

complete vehicles, even if they supply to other component producers. The tooling industry relies on capital investment by MVPs as noted above.

This reliance can have adverse effects on the supply chain. For example, the House of Representatives Standing Committee on Employment, Workplace Relations and Workforce Participation reported that the global price matching practices of the MVPs, including the requirement that local suppliers match developing countries 'ex works' prices (that is, prices of goods leaving the factory) without including transportation and storage costs, combined with the contract management process, had led to an insecure trading environment.[11] Such practices can seriously affect those firms reliant on the MVPs and militate against sufficient growth in internal cash flow from retained earnings to finance productivity-enhancing automation or investment in R&D. The resulting financial stress and lack of competitiveness puts the viability of local suppliers at risk and can act as a disincentive to continued investment in Australia.

Component sector benchmarked performance

The Automotive Supplier Excellence Australia Stage 2 initiative found that the capabilities in the automotive component producer sector requiring the most attention were management and leadership, followed by manufacturing and quality, supply chain integration and management, global sourcing and marketing strategies and financial systems and practices. This is discussed more fully in Chapter 9.

SUMMARY OF FINDINGS

- The Australian automotive industry needs to continue expanding its exports to attain the scale necessary to be globally competitive.
- MVPs and Tier 1 component manufacturers are facing increasing competition for scarce investment funds from other-country-based subsidiaries within their global organisation. Nevertheless, the Australian automotive industry continues to be globally competitive, maintaining a strong export base even in the context of an appreciating Australian dollar.
- The Australian Middle East market is vulnerable to import competition from China, India and Thailand and also a possible shift to a preference for smaller vehicles. On the other hand, there is also the opportunity to expand Australia's market in the Middle East and North Africa, including in Libya.
- The trend towards smaller, lower fuel-consumption vehicles impacts on local vehicle producers and the supply chain, with the domestic market share of Australian MVPs falling. Nonetheless, there are encouraging signs that Australian producers are responding to these changing circumstances, such as plans to locally produce the Ford Focus and Toyota Camry hybrid.
- Consistent with trends in other major automotive-producing countries, and with large trading losses occurring, justifying domestic production presents a major challenge to Australian MVPs.
- The strength of the Australian dollar is having a major negative impact on the competitiveness of the Australian automotive industry.
- The Australian component manufacturing sector is fragmented, with many financially stressed small firms operating in the industry. This has led to a range of inefficiencies within the component industry associated with lack of scale, and underdevelopment of the management systems and organisational capabilities required to compete effectively.
- Component producers must now compete against production from developing countries with lower cost structures than Australia and increasingly competitive product quality.
- The capabilities and, in some cases, the scale of smaller component manufacturers need to be raised closer to international best practice if they are to survive and be viable in the industry. This includes management and leadership improvements.

11 House of Representatives Standing Committee on Employment, Workplace Relations and Workforce Participation, *Shifting Gears: Employment in the Automotive Components Manufacturing Industry*, HRSCEWR, Canberra, 2006, p. 13.

CHAPTER 3:
THE GLOBAL AUTOMOTIVE INDUSTRY

INTRODUCTION

The production of motor vehicles represents the largest manufacturing sector in the world: if it were a country, the industry would have an output equivalent to that of the world's sixth-largest economy.[1] While it is a key activity in advanced industrial nations, the industry is also of increasing significance in the emerging economies of North and East Asia, South America and Eastern Europe. It draws on a wide range of supplier industries, from raw materials (such as steel, aluminium, plastics and chemicals) through to sophisticated component assemblies, tooling, design and engineering services. The industry is also one of the largest investors in R&D, playing a key role in society-wide technological development. With its skill base and innovative practices, the automotive sector is seen as providing an effective national training ground for many manufacturing and engineering employees across very diverse industries.

GEOGRAPHICAL DIVERSIFICATION AND GLOBALISATION OF PRODUCTION

Global production and sales

On a global scale, the production of motor vehicles has expanded significantly since the late 1990s. Global production of passenger motor vehicles grew by around 25 percent between 1999 and 2006, from just under 40 million units to almost 50 million units. Global production of commercial vehicles increased from nearly 16.5 million units in 1999 to over 19 million units in 2006, an increase of around 16.6 percent.

Global vehicle sales have also been increasing steadily, with sales rising in both mature and emerging markets. Motor vehicle producers (MPVs) sold 65.2 million units in 2006, the fifth consecutive year of record sales. Moreover, industry sales have increased by more than 30 percent in the last decade, or at about twice the pace of expansion in the previous two decades.[2]

Nonetheless, sales growth has significantly lagged behind the growth of production volumes (with 65.2 million sales versus nearly 70 million units produced). Indeed, significant excess capacity continues to exist in the industry. According to CSM Worldwide, the industry began the current decade at only 68 percent of capacity utilisation—well below the 80 percent considered necessary for sustained profitability. While that level rose to about 76 percent by the end of 2005, CSM forecasts significant over-capacity to continue at an annual average of some 18.4 million units in the 2008–2014 period.[3] As a result, a large number of MVPs, particularly in the mature economies, have undertaken costly restructurings and rationalisations in order to reduce capacity and realign both their production volumes and employee numbers with often stagnant or even negative domestic sales growth. The recent slowdown in the US automotive industry is exacerbating this trend.

1 *Organisation Internationale des Constructeurs d'Automobiles* (OICA), 2008, http://oica.net/category/economic-contributions/

2 PriceWaterhouseCoopers, *Global Automotive Financial Review: An Overview of Industry Data Trends and Financial Reporting Practices*, PWC, n.p., 2007, p. 8.

3 Cather, C, *Navigating the Auto Industry's Volatile Waters*, CSM Worldwide, n.p., 2008, viewed at http://www.automotivedigest.com/WhitePapers/CSM_FFS_NavigatingAutoIndustry.pdf

Rise of emerging markets and geographical dispersion of production

Demand for vehicles has grown rapidly in developing countries, providing an incentive for the major global vehicle and component manufacturers to set up production facilities in these markets. In its 2002 review of the vehicle industry, the Productivity Commission noted there were several factors that reinforced this incentive, all of which are of continuing relevance today:

- local industry support measures that have both encouraged investment in production facilities and discouraged servicing these markets via exports;
- improved automotive infrastructure, production skills and tooling capacity in many emerging vehicle-producing countries (to which one could add strengthening R&D capabilities); and
- logistical considerations that encourage the location of component producers close to their customers, including just-in-time and/or sequenced vehicle production.[4]

While developed countries still account for the bulk of global vehicle, component, and related development and design activities, the geographical diversification of production has resulted in a shift in the balance of output towards developing economies. Countries such as China, the Republic of Korea, Brazil, India, Russia, Thailand and Mexico possess thriving automotive sectors, as both local and foreign investment flow into new and already established manufacturing plants. A number of countries in Eastern Europe (particularly the Czech Republic and Slovakia) have also been recipients of major investments in new vehicle manufacturing plants.

It is estimated that emerging markets will contribute about two-thirds of the growth in global light vehicle assembly volumes between 2006 and 2014. In particular, the group of rapidly emerging economies known as BRIC (Brazil, Russia, India and China) is expected to significantly increase its share of the total—from 16 percent of global light vehicle assembly in 2006 to 23 percent in 2014—while production in the European Union, North America and Japan will either decline (albeit slightly) or experience only marginal growth. China, in particular, has experienced rapid growth in both production and sales. China is now the world's second-largest automotive market, producing around 9 million vehicles in 2007, up almost 23 percent from 2006.[5]

The competitive impact brought about by the rise of developing economies, particularly China, points to the significance of the increasing shift of output towards emerging economies. Along with lower prices for consumers, the real significance lies in the intensification of cost-cutting pressures and increasing competition for new investment in the industry. And these pressures are poised to intensify if China embarks on a determined export drive, resulting in an influx of Chinese vehicles into the mature markets of North America, Western Europe, Japan and Australia.[6] Increasingly, these mature economies are battling to compete against their lower cost rivals, several of whom—for example, China—are now developing significant design, engineering and R&D capabilities.

In view of the challenges posed by emerging economies, a number of conditions or objectives can assist a high-wage country to develop and sustain a globally competitive automotive industry. Among such conditions or objectives are innovation, including successfully commercialising inventions, world-class design, engineering and R&D capabilities, production scale, and aggressive marketing and branding.

PROFITS

The combination of intensified competition, ensuing cost pressures and excess capacity has placed increasing strain on MVPs' profit levels. After adjusting for overheads, interest and one-off payments, Ford and GM in particular recently suffered large net losses. This was due to costs associated with reorganisation to align production with demand and other factors. For example, GM reported a net loss of US$38.7 billion in 2007, while Ford reported a net loss of US$2.7 billion for the same year. GM also reported a net loss of US$3.25 billion for the first quarter of 2008,[7] while Ford reported a surprising US$0.1 billion profit for the same period but does not expect to return to full-year profitability until 2009.[8]

Against the background of increasing global economic challenges—caused in particular by the global credit crunch, continuing high petrol prices and rising

4 Productivity Commission, *Review of Automotive Assistance Inquiry Report*, Report No. 25, PC, Melbourne, 2002.

5 *Organisation Internationale des Constructeurs d'Automobiles* (OICA) *Production Statistics*, 2007, http://oica.net/category/production-statistics/

6 KPMG, *China's Passenger Car Market*, KPMG, n.p., 2006. Note that, while China's PMV exports are steadily rising, they still account for only about 1 percent of total sales. It is thus likely that the full impact on the global industry of China's rise as a major automotive producer will be felt only when its much-anticipated export drive becomes a reality.

7 Kim, S & D Aubin, 'GM may burn $13.9 billion cash by end of 2010: BofA', *Reuters*, 24 June 2008, viewed at http://www.newsdaily.com/stories/n24345054-gm-loans-bofa/

8 Krisher, T, 'Ford posts surprise 1Q profit, still expects full-year loss', *Associated Press*, 24 April 2008, viewed at http://biz.yahoo.com/ap/080424/earns_ford.html

raw material costs—other MVPs experienced varied fortunes. Toyota warned that its profit would fall by an overall 29.5 percent in 2008, after reporting that its profit declined by 28 percent in the first quarter to ¥316 billion.[9] Honda's net profit fell by 85.6 percent for the first quarter of 2008,[10] while Nissan reported that it expected its net profit for the fiscal year through to March 2009 to fall by 30 percent to ¥340 billion.[11] In addition, Renault's net profit in 2007 fell 7.6 percent to €2.73 billion.[12] Some MVPs, however, recorded better results. In the first quarter of 2008, Daimler AG achieved a net profit of €1.3 billion, largely on the back of its booming Mercedes Benz division,[13] while Volkswagen reported an after-tax profit of €0.9 billion.[14]

EMPLOYMENT

The automotive industry is a significant employer of labour in both developed and emerging economies. According to the Organisation Internationale des Constructeurs d'Automobiles (OICA), about 9 million people are directly employed in the industry. This is over 5 percent of global manufacturing employment.

The most recent available data show that China now has the largest automotive industry workforce, with around 1,605,000 employees, followed by the United States (954,210), Germany (773,217), Russia (755,000) and Japan (725,000). In 2006 the automotive labour force in these five countries accounted for about 53.5 percent of global employment in the industry. However, several emerging economies have substantial and, in most cases, rapidly growing automotive employment levels. Along with China and Russia, these include Brazil (289,082 employees), India (270,000), Turkey (230,736), Thailand (182,300), Mexico (137,000) and South Africa (112,300).[15]

Over the last few years automotive employment growth in the advanced economies has been relatively stagnant, and in some countries employment has actually declined. In North America around 100,000 employees are set to leave the industry over the next couple of years, while employment levels in Western Europe and Australia have also come under pressure from a spate of plant closures and abolished shifts.

THE AUTOMOTIVE SUPPLY SECTOR

While global demand for automotive products has been growing for several years, large segments of the supply industry have been struggling. Many suppliers have closed up shop and others are fighting for survival. Among the problems currently faced by suppliers are soaring raw material prices and constant demands from automakers to reduce prices and self-finance R&D. As vehicle manufacturers strive to reduce costs and achieve greater scale efficiency, they have tended to source from fewer and larger component suppliers, and they have either switched supply to lower cost sources or pressured component producers to achieve cost-down targets.

The components sector is becoming increasingly global. The number of manufacturing plants operated by supplier companies has increased considerably over the last 10 to 15 years. In addition, many previously medium-sized supplier companies have expanded into larger global firms. A large number of companies that had only three or four production plants in a small number of countries at the beginning of the 1990s now have a production network of well over 20 locations around the world. Some companies have even become 'mega-suppliers', operating location networks of 100 to 200 production sites.[16]

Several other global trends affect the automotive component sector:

- Private equity firms and hedge funds have played an increasingly active role in the industry, as struggling and sometimes near insolvent suppliers have been viewed as desirable takeover targets. Often, cost and revenue pressures have been heightened as a result of these changes.[17]
- Integration and mutual dependency between automakers and their suppliers have increased, ensuring that 'managing the supply chain' becomes a key ingredient of success. Tier 1 suppliers are now highly integrated in the value chain of their original equipment manufacturer

9 Lewis, L, 'Toyota profits warning sends market tumbling', *Times Online*, 8 May 2008, viewed at http://business.timesonline.co.uk/tol/business/industry_sectors/transport/article3892434.ece

10 Reuters, 'Quarterly profit at Honda tumbles 86%', *International Herald Tribune*, 25 April 2008, viewed at http://www.iht.com/articles/2008/04/25/business/25honda.php

11 The Associated Press, 'Nissan's 4Q profit rises, but automaker forecasts sliding profit on currency, costs', *International Herald Tribune*, 13 May 2008, viewed at http://www.iht.com/articles/ap/2008/05/13/business/AS-FIN-EARNS-Japan-Nissan.php

12 The Associated Press, 'Renault 2007 net falls but margin rises', *International Herald Tribune*, 14 February 2008, viewed at http://www.iht.com/articles/2008/02/14/business/14renaultfw.php

13 van Loon, J, 'Daimler net more than doubles on EADS gain', *Bloomberg*, 15 May 2008.

14 Volkswagen Group, *Volkswagen Group Records Profit Growth at All Brands in First Quarter*, media release, 30 April 2008, viewed at http://www.volkswagenag.com/

15 *Organisation Internationale des Constructeurs d'Automobiles* (OICA), 2008, viewed at http://www.oica.net.au

16 KPMG, *Global Location Management in the Automotive Supplier Industry*, KPMG, Germany, 2005, p. 5.

17 PriceWaterhouseCoopers, *Global Automotive Financial Review: An Overview of Industry Data Trends and Financial Reporting Practices*, PWC, n.p., 2007, p. 18.

customers, and most Tier 2 suppliers are likewise integrated in at least the supply chain of their respective Tier 1s. Consequently, any problem for a supplier usually becomes a problem for the manufacturers up the chain.[18]

- Component manufacturers in mature economies increasingly confront competitive threats from the rise of low-cost developing country producers, particularly in Asia and Eastern Europe. These component suppliers are also increasingly competitive in terms of quality and related R&D capabilities. Moreover, their MVP customers are not only sourcing components produced in Asia or Eastern Europe for their manufacturing operations in those regions: they are sourcing them in their 'home' markets as well.[19]

AUTOMOTIVE CAPABILITIES

Understood broadly, motor vehicle manufacturing is an activity that covers a wide range of capabilities, involving both productive and intellect- or knowledge-intensive labour. These capabilities encompass R&D, along with design and engineering and the various phases of manufacture and assembly. There are 15 countries in all, including Australia, that have the full range of capabilities from concept to delivery. In terms of high value-added and sophisticated design and engineering capabilities, the leading countries are Japan, Germany, the United States, France, Italy, Sweden and the United Kingdom. Japan and Germany in particular have established a reputation for innovative technologies and world-class R&D facilities, as well as high-performance and (in the case of Japan) environmentally friendly and fuel-efficient cars. Outside Japan, the Republic of Korea and Australia are the main centres of design and engineering services in the Asia–Pacific region.

There are a few developing or emerging economies that are starting to acquire significant design and engineering capabilities. In particular, China and India are striving to 'move up the value chain' by developing these capabilities alongside their vast and rapidly growing manufacturing capacities. For example, a number of Chinese vehicle manufacturers are making progress in full-scope R&D and design activities in the low-end car segment but are still behind in overall innovative capacity. The vast majority of emerging economies, however, are restricted to manufacturing and assembly operations.

18 ibid.

19 KPMG, *Automotive and Components Market in Asia*, KPMG, n.p., 2005.

CHANGES IN MARKET DEMAND AND TECHNOLOGY

The profile of vehicle demand varies considerably across national markets. For example, in the US market, the rise of SUVs in the 1990s has given way to the increasing market ascendancy of crossover utility vehicles, which are forecast to grow by 2.1 million units from 2006 to 2014.[20] In Japan minicars have been market leaders, while in Europe, South America and most Asian markets small and medium-sized models account for the bulk of sales. By comparison, the Australian market is 'hollowing out', with a marked trend away from medium–large models towards small and medium cars, luxury cars and SUVs.[21]

Recent trends in market demand, particularly in the more industrially advanced countries, have been driven by changing community and consumer expectations in regard to vehicle quality, safety and environmental credentials. In particular, increasing concern over carbon dioxide emissions and fuel economy has shaped consumer tastes and led to increasing demand for alternative fuel or hybrid vehicles and a drop-off in demand for what are perceived as 'petrol-guzzling' larger cars and SUVs (notwithstanding the rebound in 2007 and the first half of 2008 in SUV sales in Australia). As a result, technological developments are proceeding rapidly so as to keep pace with both changing consumer expectations and tighter regulation by governments striving for more environmentally friendly and fuel-efficient cars.

Environmental and safety concerns have been important drivers of product innovation in the automotive industry. The development and incorporation of computer technology have been central in this respect. Automotive computers monitor or control everything from anti-lock brakes, electronic stability controls and airbag safety systems to emission controls, fuel efficiency and global positioning systems. Alternative fuel systems (including hybrids) are also becoming more popular. In his speech to Parliament marking World Environment Day on 5 June 2008, Prime Minister Rudd referred to PriceWaterhouseCoopers' estimate "that 541,000 full hybrids were produced in 2007, and that this should quadruple to 2.2 million by 2015". He also referred to

20 PriceWaterhouseCoopers, *Global Automotive Financial Review: An Overview of Industry Data Trends and Financial Reporting Practices*, PWC, n.p., 2007 at p. 13.

21 Department of Innovation, Industry, Science and Research, *Key Automotive Statistics 2001*, DIISR, Canberra, 2002; *Key Automotive Statistics 2006*, DIISR, Canberra, 2007, Table 3.

the "general expectation in the industry that hydrogen fuel cells are the technology of the future".[22]

While hydrogen may be the wave of the future (and not expected to become truly viable until around 2030), the March 2008 King Review commissioned by the UK Government concluded that fuel consumption for new vehicles could be cut by 30 percent within the next five to ten years by using existing technologies. For example, "Recent improvements in engine technology such as direct fuel injection have helped to achieve increased fuel economy and reductions in CO_2 without sacrificing performance, cost or convenience to the car buyer. Despite a 20 percent weight gain of midsize vehicles in the past 20 years, a long-term trend of 0.6 percent fuel efficiency improvement per year has been observed, as a result of technical improvements".[23] There is also a range of future technology options which could become increasingly important in the race for greater fuel efficiency, such as increasing use of lightweight materials, evolutionary improvements to current engines, and new powertrain technologies—the latter "including variable valve actuation, direct injection and turbo-charging, as well as 'mild' hybrid technologies such as stop-start and regenerative braking".[24]

CHALLENGES FACED BY THE LEADING INDUSTRIAL NATIONS

The state of vehicle manufacturing in the developed industrial regions of North America, Western Europe and Japan is somewhat of a mixed bag. Severe competitive pressures and costly restructurings (particularly in North America and Western Europe) are partly offset by some positive signs of renewed growth, due in no small part to ongoing product and process innovations (with a similar set of circumstances currently impacting the industry in Australia, albeit in the context of a much smaller industry and market).

In North America, the 'Big' automakers (GM, Ford and Chrysler) are facing severe competitive challenges. All three companies are undergoing difficult restructuring as they struggle to bring their capacity and workforce into line with their diminished market shares. Recent and prospective plant closures are expected to result in the shedding of 1.9 million units of capacity, along with around 100,000 employees.

Apart from eliminating fixed costs, recovery efforts will largely hinge on recapturing, or at least stabilising, market shares through a renewed product range. On the other hand, almost 1 million units of assembly growth are expected in the next few years as a result of localised assembly of previously imported vehicles by the so-called 'New Domestics' (mainly Japanese-owned MVPs that are building new capacity in recently established or brand new greenfield sites outside the heavily unionised industrial heartlands such as Detroit).[25]

In Japan, domestic sales have been stagnant since the mid-1990s, but the growth of export volumes has been picking up the slack. In fact, for several years the majority of growth that has taken place in the Japanese automotive assembly sector can be attributed to the export volume that resulted as automakers shifted strategy to leverage Japan as a hub of higher value-added products such as petrol-electric hybrids and luxury vehicles. Nonetheless, light vehicle assembly is expected to fall considerably between 2006 and 2014, largely due to an expected fall of 410,000 units in Toyota's home manufacturing base. This stems largely from the company's strategic decision to produce more vehicles in offshore locations such as Thailand and the United States.[26] Other Japanese-owned MVPs, such as Honda and Nissan, have also been focusing on expanding their offshore operations.

Europe has experienced several high-profile plant closures in recent years. Moreover, capacity has been reduced at a number of other plants as a result of eradicating shifts. The result has been a 1.5 million unit reduction of capacity in Western Europe between 2000 and 2007. Some capacity has been relocated to lower cost greenfield sites in Eastern Europe, particularly the Czech Republic, Slovakia, Poland, Turkey and Romania. On the other hand, vehicle assembly is rebounding in some established car producing nations, particularly Germany, which, according to PriceWaterhouseCoopers' forecast, "will likely see an increase of more than 900,000 units by 2014".[27] However, this forecast may have to be revised in light of the European Commission's proposal in December 2007 to regulate for a tailpipe emissions target by 2012.[28] For Germany, as with Japan, growth

22 Rudd, K, House of Representatives 2008, Hansard, No. 7, 5 June 2008, pp. 4692–7. World Environment Day Ministerial Statement by the Hon. Kevin Rudd, 5 June 2008.
23 King, J, *The King Review of Low-Carbon Cars. Part I: The Potential for CO_2 Reduction*, HM Treasury, London, 2007, p. 43.
24 ibid., p. 44.
25 PriceWaterhouseCoopers, *Global Automotive Financial Review: An Overview of Industry Data Trends and Financial Reporting Practices*, PWC, n.p., 2007, p. 12.
26 ibid., p. 8.
27 ibid.
28 King, J, *The King Review of Low-Carbon Cars. Part II: Recommendations for Action*, HM Treasury, London, March 2008, p. 27.

is predicated on export volumes and specialisation in high value-added production, particularly engineering and design excellence.

Despite their problems, the advanced economies should be among the best performers in reducing excess capacity over the next several years. By 2014 the European Union (which imposes a tariff rate on PMVs of 10 percent) is expected to upgrade manufacturing utilisation by about 6.6 percent, while North America is expected to improve by 4.5 percent. On the downside, one of the key drivers in this improving utilisation has been the increase in cost-cutting pressures and attendant plant closures and shift reductions—although for the European Union at least lower cost capacity has been added in new lower wage EU countries.[29]

SUMMARY OF FINDINGS

- Global production of motor vehicles has expanded rapidly in recent years, from around 56.5 million vehicles in 1999 (both passenger motor vehicles and commercial vehicles) to nearly 70 million vehicles in 2006. This upward trend is set to continue, but with significant production capacity and employment shifting to emerging economies.
- The global industry is marked by significant excess capacity, which has placed profit margins, particularly in industrialised countries, under significant pressure.
- Increasing geographical diversification of production has resulted in a shift in the balance of output towards developing countries, particularly China, the Republic of Korea, Brazil, India, Russia, Thailand and Mexico. This shift is characterised by intensification of cost-cutting pressures and increasing competition for new investment in the industry.
- The combination of these pressures has placed increasing strain on motor vehicle producers' profit margins.
- The supply sector has been dramatically impacted by the efforts of the motor vehicle producers to reduce their production costs. This has led the motor vehicle producers to source from fewer and larger component suppliers. Also, they have either switched supply to lower cost sources or pressured component producers to achieve cost-down targets.
- Advanced design and engineering capabilities still tend, for the most part, to be confined to the advanced industrial countries. However, a number of emerging economies (for example, China and India) are beginning to develop significant design, engineering and R&D capabilities.

29 ibid.

CHAPTER 4:
CURRENT AUSTRALIAN AUTOMOTIVE POLICY ARRANGEMENTS

INTRODUCTION

A stable macroeconomic environment of low interest rates and low inflation, combined with microeconomic reforms, including labour market reforms, fosters innovation, investment and international competitiveness. These economic policies are complemented by trade policies, which can improve access to international markets, and this is especially important for Australian industry, given its small domestic market. Trade policies can also lead to lower border protection and greater competitive pressures on local manufacturers. Industry policy has a role to play in helping industry to adjust to these competitive pressures and to assist industry to compete in international markets.

For the automotive industry, the two current major policies are the automotive tariff arrangements and the Automotive Competitiveness and Investment Scheme (ACIS). The industry is also supported through policies such as Tradex, duty draw-back arrangements, the LPG Vehicle Scheme, specific company-level assistance, government purchasing practices and the specific tariff arrangements for second-hand vehicles.

The Australian industry is subject to several other Commonwealth, state and territory government taxes including company tax and payroll tax. In addition, new vehicle sales are subject to the goods and services tax (GST) and the luxury car tax (LCT). Fringe benefits tax (FBT) may be payable on a vehicle provided by a business to an employee for personal use.

AUTOMOTIVE COMPETITIVENESS AND INVESTMENT SCHEME

ACIS is a transitional assistance scheme directed towards encouraging new investment and innovation in the Australian automotive industry in the context of trade liberalisation. The main objective of ACIS is to reward strategic investment, R&D, and the production of eligible motor vehicles through the issue of import duty credits to registered participants. These credits can be used to discharge customs duty on eligible automotive imports, or alternatively, can be sold or otherwise transferred.

ACIS commenced in 2001 (following the closure of the Export Facilitation Scheme in 2000) and under the current policy settings will cease at the end of 2015. Under current arrangements, ACIS is expected to deliver an estimated $7 billion to the Australian automotive industry from 2001 to 2015.

ACIS is regulated by the *ACIS Administration Act 1999*. Among other things, the Act requires that:

- capped assistance is limited to the stage caps ($2 billion from 2001 to 2005; $2 billion from 2006 to 2010; and $1 billion from 2011 to 2015); and
- assistance to individual recipients is limited to 5 percent of their previous year's sales.

When ACIS was first established, there was a single pool of funding from which both motor vehicle producers (MVPs) and component suppliers were able to claim support. However, funding for each stage is now split between MVPs (55 percent) and the supply chain (45 percent). Quarterly assistance to individual recipients is determined on a pro rata basis, using

an MVP modulation rate or a component producer modulation rate (see Table 4.1).[1]

Table 4.1. Recent ACIS modulation rates

	MVPs	Supply chain
Q1 2006	0.70	0.71
Q2 2006	0.69	0.64
Q3 2006	0.68	0.63
Q4 2006	0.62	0.64
Q1 2007	0.63	0.65
Q2 2007	0.64	0.64
Q3 2007	0.65	0.63
Q4 2007	0.63	0.63

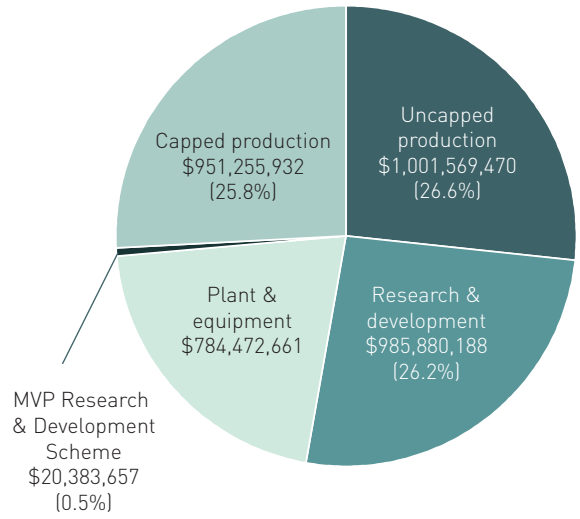
Source: Department of Innovation, Industry, Science and Research

Uncapped production credits are available only to MVPs, and credits issued are based on the value of production of passenger motor vehicles sold in Australia and New Zealand. Issued credits are not subject to modulation but, similar to capped credits, are subject to the 5 percent of sales limit.

ACIS also includes the MVP R&D Scheme which is directed at encouraging Australian MVPs to invest in high-end R&D technologies. The scheme offers up to $150 million of assistance for R&D projects over the five years from 2006 to 2010. The Government's $7.2 million Supplier Development program, funded under the MVP R&D Scheme, aims to enhance the capabilities of Australian automotive component suppliers and assist them to more effectively identify and secure emerging opportunities in international supply chains.

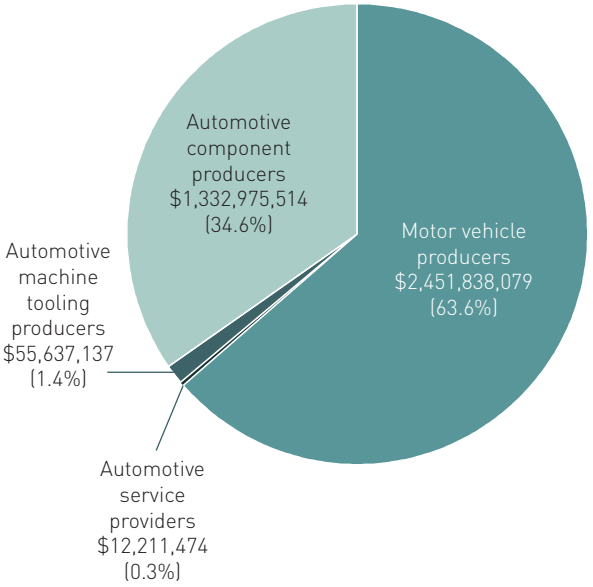
As mentioned, ACIS credits earned can be used to discharge customs duty on eligible automotive imports or can be sold or transferred. According to the Federal Chamber of Automotive Industries, the automotive industry "favours the retention of duty credits as the preferred mechanism for the delivery of investment support".[2] On the other hand, GM Holden expressed concern about the possible erosion of tariffs under future free trade agreements, and recommended that "the ACIS funding mechanism should be reviewed to provide an alternative to a duty credit which could be used to pay not only customs duties, but also tax liabilities". Government credit was viewed as a possible alternative option.[3]

Figure 4.1. ACIS payments by eligible activity: total ACIS Stage 1 and 2 paid to third quarter 2007, including $ values for each activity



Source: AusIndustry

Figure 4.2. ACIS payments by registration category: total ACIS Stage 1 and 2 up to fourth quarter 2007



Source: AusIndustry

1 The modulation rate is used to adjust claims to ensure that the capped pool of funding is not exceeded. That is, credits earned by participants are modulated (or reduced) to provide a 55 percent allocation of the available modulated credit to MVPs and 45 percent to the supply chain.

2 FCAI, *Submission to the 2008 Automotive Review*, p. 25.

3 GM Holden, *Submission to the 2008 Automotive Review*, p. 43.

Total ACIS payments paid up to the third quarter and fourth quarter of 2007 are shown in Figures 4.1 and 4.2.[4]

The eligibility thresholds, rates of assistance, activity limitations and eligible R&D items are at Appendix B. ACIS claims are subject to modulation (and paid to companies on a pro rata basis) to ensure that the capped pool of funds is not exceeded.

The Productivity Commission estimated that the automotive industry received $621 million in budgetary assistance in 2006–07.[5] The assistance was mainly through ACIS, which has effectively underwritten profits for the industry. The situation is not sustainable and has kept marginal firms, which would not survive without assistance, in the industry. Such circumstances inhibit a process of rationalisation that would help the industry achieve greater economies of scale and productivity improvements.

The impact of ACIS on the level of innovation and R&D in the automotive industry is discussed in greater detail in Chapter 6.

TARIFFS

Applied tariffs on passenger motor vehicles and related components are currently 10 percent and are scheduled to be reduced to 5 percent on 1 January 2010. Tariffs for light commercial vehicles, including four-wheel drives and parts thereof, are currently only 5 percent. However, when combined with the effect of ACIS (which provides import duty credits to the local industry) and preferential access through trade agreements, the average import-weighted tariff (or nominal tariff) in 2006–07 was 5.7 percent for vehicles and 4.2 percent for components.[6]

Nevertheless, automotive tariffs are the second highest tariffs in Australia, behind the textiles, clothing, footwear and leather industry. In addition, the Productivity Commission estimated that the industry received net tariff assistance of nearly $635 million in 2006–07, or over $600 per vehicle sold in that year.[7] This equates to a subsidy to local manufacturers of nearly $2,000 per vehicle produced in Australia. Automotive tariffs are, however, much lower than they were when a program of reform commenced in the mid 1980s. In 1984, for example, the industry was protected by an import quota and a tariff of 57.5 percent.

4 Numbers may not total 100 percent due to rounding.
5 Productivity Commission, *Trade and Assistance Review 2006–07*, PC, Canberra, 2008, Table 2.5B.
6 Productivity Commission, *Modelling Economy-wide Effects of Future Automotive Assistance. Research Report*, Table 3.2.
7 Productivity Commission, *Trade and Assistance Review 2006–07*, Table 2.2B.

The Department of Foreign Affairs and Trade (DFAT) noted that trade liberalisation "has benefited Australian consumers and business, by making possible cheaper prices and greater choice. As the industry has adjusted, it has become more efficient, more closely integrated into global supply chains and more focused on niche capabilities and markets".[8]

RECENT REGIONAL TRADE AGREEMENTS

Free trade agreements (FTAs) have the potential to open up markets for the Australian automotive industry by removing impediments to trade, including tariffs and non-tariff barriers (such as local taxes or customs requirements). Conversely, FTAs generally open up the domestic industry to greater international competition by lowering tariff rates. Australia has FTAs with the United States, Singapore, New Zealand and Thailand. FTAs are also under negotiation or consideration with the Association of Southeast Asian Nations (ASEAN) and New Zealand, Chile, China, the Gulf Cooperation Council, India, Indonesia, Japan, Malaysia, Mexico and the Republic of Korea.

After the FTA with Thailand came into force, Thailand restructured its excise on motor vehicles according to engine size. The excise disadvantages Australian car exporters, which produce only large-engine vehicles. This and other impacts of FTAs on the local automotive industry are considered in greater detail in Chapter 7.

SECOND-HAND CAR TARIFF

All used vehicles built on or after 1 January 1989 need to qualify under the Specialist and Enthusiast Vehicle Scheme or Registered Automotive Workshop Scheme and be certified as complying with Australian Design Rules applicable at the date of the imported vehicle's manufacture. All used vehicles manufactured before 1989 may be imported without restriction.

Used vehicles attract a tariff of 10 percent for passenger vehicles and 5 percent for light commercial vehicles and 4WDs, in addition to a non-ad valorem tariff of $12,000.[9] Vehicles imported under the two schemes do not attract the non-ad valorem tariff. In 2006–07, 27,854 second-hand motor vehicles were imported into Australia, an increase of 61 percent over the previous year.[10]

8 DFAT, *Submission to the 2008 Automotive Review*, p. 5.
9 Ad valorem means 'fixed in proportion to the value'.
10 Department of Innovation, Industry, Science and Research, *Trade Information System* (incorporating unpublished import and export data from the ABS), DIISR, Canberra, 2008.

DESIGNS ACT 2003

Before 2003, MVPs were able to register the designs of individual car parts and obtain monopoly rights for 16 years under the Commonwealth *Designs Act 1906*. In 2003, the Government excluded spare parts from design protection to ensure effective competition in the spare parts market. Also known as the 'right of repair exemption' this was done through Section 72 of the *Designs Act 2003* (the Designs Act). Under this exemption, registration of all new and distinctive designs of component parts is permitted, but where these parts are used for the repair of a complex product so as to restore the product's overall appearance, manufacturers and suppliers of these component parts are exempt from any liability for infringement.

In 2005, in accordance with the Australian Government's 2003 commitment, IP Australia conducted a review of the impact of the Designs Act 'right of repair' provision. IP Australia reported that the provision exemption should remain, as it could not find sufficient evidence that the reforms were achieving their policy objectives. IP Australia's review noted that the long lead times between registration and market entry of products means that the Section 72 reforms have not as yet made an impact on consumers and the spare parts industry.[11]

The European Union has adopted a similar position to that of Australia by removing design protection for spare parts. Members have been allowed a five-year transition period to give effect to the relevant law reforms.

OTHER SUPPORT ARRANGEMENTS

Tradex

The Tradex Scheme enables exporting companies to obtain an up-front exemption from customs duties and other taxes provided that the goods are subsequently exported, or incorporated in goods that are exported, within 12 months or another approved period. In this way, the scheme provides benefits to exporters that are equivalent to those available in a free trade zone, without the expenses involved in maintaining a bonded warehouse.

Duty Drawback Scheme

The Duty Drawback Scheme enables exporting companies to obtain refunds of payments of customs duties where those goods will be treated, processed or incorporated in other goods for export or when goods are re-exported unused. Duty drawback can only be claimed after the goods have been exported.

Team Australia Automotive

Vehicle supply chains are becoming increasingly globalised. Team Australia Automotive aims to enhance opportunities in global supply chains by discovering opportunities and matching these opportunities with the capabilities of the Australian automotive industry. The Australian Government has provided grants to the Team Australia Automotive consortium. The role of Team Australia Automotive is discussed further in Chapter 7.

Specific company-level assistance

There have also been a number of one-off measures implemented to assist the industry achieve specific goals, including Australian Government assistance to Ford Australia and to GM Holden. The $52.5 million grant to Ford Australia, with additional assistance from the Victorian Government, was to enable the company to develop the next generation Falcon and design and engineer a pick-up truck platform for the global market. Similarly, there was a $6.7 million grant to GM Holden, with additional funds from the Victorian and South Australian Governments, to introduce safety and fuel management improvements and further reduce greenhouse gas emissions from Commodore vehicles.

LPG Vehicle Scheme

The Australian Government established the LPG Vehicle Scheme to assist private use motorists with the purchase of a new LPG vehicle or the conversion of a new or used petrol or diesel vehicle to LPG. Two different grants are available: a grant of $2,000 following the LPG conversion of a new or used petrol or diesel motor vehicle; or a grant of $1,000 for the purchase of a new motor vehicle with an LPG unit fitted at the time of manufacture of the vehicle.

As of 15 June 2008, 136,838 grants had been paid, with a total value of $272.6 million.[12]

11 IP Australia, *Review of the 'Spare Parts' provision in the 'Design Act 2003'*, IP Australia, Canberra, 2005, p. 6.

12 AusIndustry, *LPG Vehicle Scheme Statistics*, DIISR, Canberra, 2008, viewed at http://www.ausindustry.gov.au/content/content.cfm?ObjectID=A622D054-FBD0-48A2-A70D56E6002630CD&L2Parent=&L3Parent=D47685C8-0B0B-459C-B07A2EFBDB3D4AF7

Government purchasing policies

Business and government fleet purchasers accounted for over three-quarters of total domestic demand for Australian-made vehicles in 2007 (business accounting for 56.8 percent and government 18.5 percent). Government purchases are supported by local preferences applying to some government entities at the state and national level. For example, the Victorian Government's car fleet contracts are with domestic producers.

The Commonwealth and all the states and territories are actively encouraging the purchase of more fuel-efficient vehicles. These policies are discussed in greater detail in Chapter 8.

Green Car Innovation Fund

The Australian Government has announced that it will establish a Green Car Innovation Fund worth $500 million over the five years from 2011. The Fund aims to provide incentives for R&D and innovation, and to support the use of new engineering solutions and advanced materials to improve fuel efficiency in Australian-made vehicles. The Fund will involve the Australian Government investing one dollar for every three dollars invested by the industry. The aim is to generate at least $2 billion worth of R&D investment in green cars.

In June 2008, the Australian Government announced that it was bringing forward $35 million of the Fund to assist Toyota to assemble 10,000 hybrid Camrys a year, beginning in 2010. Both the engines and hybrid components will, at least initially, be imported from Japan, while the cars will be assembled at Toyota's Altona plant in Melbourne. The Government also announced that it would use the Fund to improve by 20 percent the fuel efficiency of cars built in Australia by 2010.

The Fund is discussed further in Chapter 8.

DOMESTIC TAXATION OF VEHICLES

Vehicles are subject to a range of taxes on both purchase and use. Under Australia's federal system of government, taxes are levied at both the national and state and territory levels.

National level

A 10 percent GST applies to the sale of all automotive vehicles. This tax operates in a similar way to the value-added taxes common in many other countries. An LCT of 25 percent applies on retail values in excess of $57,123 for the 2007–08 financial year (that is, 25 percent only on the proportion of the price above this amount). The car limit is indexed annually. Certain commercial vehicles, emergency vehicles, motor homes, campervans and vehicles adapted to carry people seated in wheelchairs are exempt from the LCT. The LCT threshold is also the maximum value of a vehicle for depreciation purposes. The LCT raised nearly $298 million of revenue in 2004–05. Over three-quarters of LCT collections in that year were raised from companies.

From 1 July 2008, the LCT is due to increase from 25 percent to 33 percent, a change that was announced in the 2008–09 Budget. The legislation was passed by the House of Representatives in June 2008 but, at the time of writing, it had been referred to a Senate Committee for consideration. It is also being considered as part of the review into the Australian taxation system conducted by the Treasury Secretary, Dr Ken Henry AC.

State and territory level

State and territory taxes vary in detail and level from state to state. However there are some common elements. Stamp duties are ad valorem taxes (approximately 3 percent) on the first registration of vehicles. There is also a flat fee for the initial issue of licence plates in most states and territories. Annual registration fees are levied on all motor vehicles with higher fees for large commercial vehicles and lower fees for motor bikes. All vehicles are required to carry insurance covering personal injury caused to third parties.

The industry is also subject to payroll tax, with different thresholds applying across the states and territories.

Fuel taxes

Excise duty is currently applied at a rate of 38.143 cents per litre to unleaded petrol and diesel. Ethanol and biodiesel also attract an excise rate of 38.143 cents per litre but they also receive an offsetting production subsidy. In addition, all fuels are subject to GST. The combined effect of the excise duty and the GST on fuel also has been referred to Dr Henry's taxation review for consideration.[13]

An excise duty is currently not levied on LPG. However, from 2011, an excise duty of 2.5 cents per litre will be implemented, rising to 12.5 cents per litre in 2015.

13 Shanahan, P, 'PM hits break on luxury car tax', *The Australian*, 27 May 2008.

Fringe benefits tax

FBT is levied on vehicles provided by an employer for an employee's private use, including those used by an employee under a novated lease arrangement.[14] The statutory formula used to levy FBT is on a sliding scale, which decreases as the distances travelled increase. The FBT will be discussed in further detail in Chapter 8.

SUMMARY OF FINDINGS

- The Automotive Competitiveness and Investment Scheme has recently underwritten the profitability of many firms in the automotive industry. However, underwriting profitability has the effect of keeping marginal firms in the industry and inhibits a process of rationalisation that would help the industry achieve greater economies of scale and productivity improvements.
- The automotive industry receives substantial support from the Australian Government.
- Tariff support to the automotive industry equates to over $600 per new vehicle sold in Australia, or nearly $2,000 per vehicle manufactured here.
- Nevertheless, assistance to the industry has fallen significantly over the past two decades, and has moved from high tariffs and quotas to other forms of support.
- It is appropriate to retain the section 72 exemption of the *Designs Act 2003*, subject to IP Australia's review process.

14 The Australian Taxation Office provides the following description of a novated lease: "Under a novated lease arrangement, you take over all or part of the lessee's rights and obligations under the lease. This transfer of rights and obligations is agreed to in a deed of novation between you, the finance company and the lessee. The lessee is usually the employee, or an associate of the employee." For more detail, refer to http://www.ato.gov.au/businesses/content.asp?doc=/Content/23465.htm

CHAPTER 5:
INTERNATIONAL AUTOMOTIVE POLICIES AND ASSISTANCE ARRANGEMENTS

INTRODUCTION

Significant direct employment in the industry, strong links between the industry and other parts of the economy, and perceived technological and employment spillovers have led many governments to provide forms of assistance for their automotive industries. This has variously involved the imposition of tariffs or other import barriers, foreign investment incentives, export subsidies, protection for IP rights, and support for R&D as well as investment in education and training.

Over recent years, government support in the leading industrial nations (including Australia) has shifted away from import barriers and towards support for R&D, education, training and IP, but protection from imports (often of the non-tariff variety) still plays an important role in most emerging economies. Fiscal support packages, along with incentives to attract foreign investment, such as tax holidays and reduction of income tax rates for foreign companies, are also widespread, such policies being common in both developed and developing countries. The protections given to the automotive industry in many countries are also more generous than those countries give to other sectors of their economies. These assistance arrangements are discussed more fully later in this chapter.

One particular policy-related trend affecting the automotive industry is the proliferation of free trade agreements (FTAs). For example, the United States is a signatory to 11 FTAs, and a number of others are under discussion, while Australia has four formal FTAs and is holding formal negotiations with several other economies. These complement multilateral trade liberalisation though institutions such as the World Trade Organization (WTO) and the Asia–Pacific Economic Cooperation (APEC) forum.

TARIFFS

Most countries impose tariffs on the importation of automotive goods. These tariffs are both a support mechanism for domestic automotive industries and a source of revenue. Table 5.1 shows the tariffs in a number of economies, including major automotive producing countries in Europe, the Americas and Asia.

The table shows that international automotive tariffs are still generally high relative to Australia's automotive tariffs. Moreover, many developed economies also impose relatively high tariffs, such as the 25 percent tariff imposed by the United States on imports of goods-carrying vehicles (for example, pickup trucks). This segment has been a major 'profit generator' for the domestic US producers. In addition, Malaysia, for example, has reduced its tariffs on passenger motor vehicles (PMVs) from 300 percent to 30 percent, but has increased its vehicle excise tax to between 75 and 125 percent (depending on engine capacity).

There also seems to have been some 'stepping back' by several countries in their commitments to trade liberalisation. For example, as part of its automotive policy, China introduced the *Measures on the Importation of Parts for Entire Automobiles*, which impose a tariff of 25 percent on imported components (rather than 10 percent) when the number or value of imported parts in an assembled vehicle exceeds specified thresholds (this is discussed further in Chapter 7).

Table 5.1. Automotive tariffs in selected countries

Country	PMVs (%)	Motor vehicles for the transport of goods (%)	Engines (%)	Gearboxes (%)
Australia	10	5	10	10
Brazil	35	35	18	18
Canada	6.1	6.1	0–6	6
China	25	15–25	10–17.5	18.6
European Union	10	10–22	2.7–4.2	4.5
India	105	30	30	30
Indonesia	60	5-20	15	15
Japan	0	0	0	0
Republic of Korea	8	10	8	8
Malaysia	30	30	5–30	25
Mexico	20–30	13–50	18	18
Philippines	30	3–30	1–10	10
Russia	25	10	0–3	0
Saudi Arabia	5	5	5–15	7
South Africa*	30	10–34	0	20
Thailand	80	5–40	10	30
United Arab Emirates	5	5	5	5
United States	2.5	25	0–2.5	2.5
Vietnam**	83	n/a	35–50	25

* As at 2007.
** As at April 2008.

Notes:
The tariffs are as at 2006.
Tariffs for vehicles can vary depending on factors such as engine capacity and whether they have spark or compression ignition.
Tariff preferences can apply for imports from certain countries.

Sources: US Trade Representative (2008); for Russia, European Automobile Manufacturers Association & *Cost News*, no. 9, June 2007 (following legislation introduced by the Russian Government in November 2006, imported automotive components intended for further assemblage of motor vehicles enjoy reduced customs duties (0–3% instead of the normal 5–15%)); for all others, WTO Applied Tariff Database 2006.

Further, on 22 April 2008 Vietnam announced an increase in its tariff on cars from 70 to 83 percent. The reasons cited were to reduce traffic congestion and the trade deficit.

Non-tariff barriers can also restrict automotive trade. For example, and as noted in Chapters 4 and 7, Thailand restructured its excise on motor vehicles according to engine size after the FTA with Australia came into force. The excise disadvantages Australian car exporters, which produce only large-engine vehicles.

NATIONAL AUTOMOTIVE POLICIES

Most major automotive-producing countries complement their tariff regimes with policies to protect and foster the development of a domestic automotive industry. In many instances, these policies are accompanied by specific investment incentives to attract automotive firms to establish operations in a host country, including the establishment of 'green car' manufacturing. Further, some countries, such as Malaysia, use non-tariff barriers such as import licensing and other restrictions to protect their industries.

A more complete discussion of the automotive policies and specific assistance arrangements of selected economies is at Appendix C. In summary, these include the following:

- As part of its National Automotive Policy, Malaysia has introduced an Industrial Adjustment Fund of interest-free loans and matching grants to help manufacturers face greater competition and liberalisation.
- Thailand has introduced incentives to encourage automakers to set up local production bases for 'eco-cars' that meet the most stringent European emission standards. Under the scheme, companies that produce eco-cars will not have to pay corporate income taxes on their investments for eight years, and duties on imported machinery

will be waived.[1] As at June 2008 six eco-car projects have received Board of Investment privileges, including Honda, Nissan and Suzuki. Combined production of these cars is estimated at 800,000 units in the next six to seven years. In addition, the government has exempted import tariffs on E85[2] car parts, as well as reducing excise taxes for E85-powered vehicles.[3]

- The Indian Government sees the automotive sector as a 'sunrise sector' and in January 2007 launched its Automotive Mission Plan. The plan is a joint document prepared by industry and the government, encompassing proactive action in attracting investment, affirmative action with regard to expansion of infrastructure and development of human resources.[4]
- South Africa's Motor Industry Development Program was designed to help the industry adjust and increase its competitiveness in the new post-apartheid trade policy environment. The program comprises five principal elements, including an export–import complementation scheme under which vehicle and components exporters can earn tradeable 'Import Rebate Credit Certificates' to offset duties on imported vehicles and components.
- Slovakia attracts automotive investments through a mix of a low-cost (but skilled) labour force and taxation and relocation incentives.
- In 2006 the Federal Government of Germany launched a National Hydrogen and Fuel Cell Technology Innovation Programme and is providing funding totalling €500 million over the next 10 years. Together with funds provided by the industry, this will be a long-term program with funding totalling €1 billion. The objective is to significantly step up applied research and, in particular, development activities in the field of hydrogen technology and fuel cells.[5]
- In the United States, state governments, particularly in the south, have been active in offering investment incentives to automotive makers. Incentives include property tax abatements, reduced electricity rates, extension of infrastructure, payments toward worker training programs, job creation tax credits (up to US$1,000 per new position) and pre-employment job training programs. The US Energy Department is providing $30 million over three years for plug-in vehicle projects. The funding will support the assembly of 80 plug-in vehicles for fleet testing by Chrysler, the enhancement of lithium-ion battery packs and charging systems, and the deployment of plug-in vehicle test fleets by GM (which also received support from state agencies). Additionally, Ford will work with Southern CA Edison and Johnson Controls-Saft to accelerate the mass production of plug-in hybrids.[6]
- Japan's Ministry of Economy, Trade and Industry will spend US$1.72 billion over five years for next-generation powertrains and fuels to cut petrol consumption and reduce carbon dioxide emissions. More than 75 percent of the funding will focus on hydrogen fuel cell technology.[7]

SUMMARY OF FINDINGS

- Most countries, including Australia, impose tariffs on the importation of automotive goods. Non-tariff barriers can also have the effect of limiting trade in automotive products (for example, Thailand's excise based on engine size). Additionally, countries foster the development of their domestic automotive industry through active automotive policies. In many instances, emerging economies complement these policies with specific investment incentives to attract automotive firms to establish operations in the host country.
- Australia's tariffs are relatively low by international standards. Of the major automotive producing countries, Australian has the fifth most open market as measured by the tariff rate for cars.
- The emerging automotive manufacturing countries in the region are particularly active in providing up-front support to vehicle producers.

1 Board of Investment (Thailand), *BoI to Promote Eco-Cars Maximum Incentives for Integrated Car Assembly and Key Parts Manufacturing Projects*, Press Release No. 87/2/2007 (0.41/2), BoI, n.p., June 2007.
2 E85 is a fuel which is 85 percent ethanol and 15 percent petroleum.
3 MCOT, *Govt's Incentives Insufficient for E85 Cars Made in Thailand, 2008*, viewed at http://enews.mcot.net/view.php?id=4618
4 Ministry of Heavy Industries & Public Enterprises (India), *Automotive Mission Plan 2006–2016*, MHIPE, n.p., 2007.
5 Federal Ministry of Economics and Technology (Germany), *National Hydrogen and Fuel Cell Technology Innovation Programme*, FMET, n.p., 2006, viewed at http://www.iphe.net/Germany/H2FC%20Strategy%20englV%208May2006.pdf
6 Johnson Controls, *Johnson Controls-Saft Named as Battery Supplier for Ford Test Fleet of Plug-In Hybrid Electric Vehicles*, media release, Johnson Controls Inc., Milwaukee, June 10 2008, viewed at http://www.johnsoncontrols.com/publish/us/en/news.html
7 Green Car Congress, *Japan Plans to Spend $1.72 Billion Over 5 Years to Spur Development of Low-Carbon Powertrains and Fuels, Green Car Congress*, n.p., 28 May 2007, viewed at http://www.greencarcongress.com/2007/05/japan_plans_to_.html

CHAPTER 6: INNOVATION

INTRODUCTION

Innovation is critical to the Australian automotive industry in meeting future challenges and achieving efficiency and productivity gains. While there is no single definition of what constitutes innovation, it is agreed that it is much broader than R&D and can include product and process improvements, organisational change, improvements to workforce skills and management, and technology uptake.[1] For the automotive industry, innovation is not just about improved products: it must also deliver production process improvements, faster and more effective model development systems and, for that matter, improvements throughout the complete value chain.[2]

The primary form of assistance for innovation in the automotive industry is funding for R&D. This assistance is through the Automotive Competitiveness and Investment Scheme (ACIS), and the R&D tax concession—with the definition of eligible automotive R&D under ACIS being much broader than that used for the R&D tax concession. The industry also receives support from initiatives such as the cooperative research centres and the Commercialising Emerging Technologies (COMET) programs.

Several submissions argue that this assistance for innovation is justified, since the economic benefits derived from supporting the industry 'spill over' into other sectors of the economy. While such spillovers are difficult to quantify, there are numerous examples where product or process innovations from the automotive sector have had real benefits for other sectors. Some of these examples are discussed later in this chapter.

Findings and recommendations on measures to improve the innovation and R&D performance of the industry, as well as measures to address greenhouse gas emissions and promote a 'greener' automotive industry, are also discussed in Chapters 8, 10 and 11.

NATIONAL INNOVATION SYSTEM AND OTHER CONCURRENT REVIEWS

In January 2008, the Australian Government announced a review of the National Innovation System. Among other things, the review "will identify gaps and weaknesses in the innovation system and develop proposals to address them". The review's expert panel will deliver a Green Paper, which will be followed by a White Paper response from the Australian Government.[3]

Consistent with its terms of reference, the Review of Australia's Automotive Industry worked with the National Innovation System review to achieve compatibility among the respective findings and recommendations. For similar reasons, the Automotive Review had discussions with the concurrent Review of Australia's Textiles, Clothing and Footwear Industry,[4] the Review of Australia's Export

1 This definition includes R&D as well as those innovation activities used by the OECD as set out in the Oslo Manual. (OECD, *The Measurement of Scientific and Technological Activities Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data*, 3rd Edn, OECD, 2005.)

2 FCAI, *Submission to the 2008 Automotive Review*, p. 46.

3 Carr, K (Minister for Innovation, Industry, Science and Research), *Government Announces Review of National Innovation System*, media release, Senator the Hon Kim Carr, Canberra, 22 January 2008.

4 Refer to www.innovation.gov.au/tcfreview for further information.

Policies and Programs[5] and the Garnaut Climate Change Review.[6]

This chapter provides an overview of extant innovation issues and programs relevant to Australia's automotive industry. Nonetheless, the Australian Government's broader innovation policies and programs could change in the future as a result of the National Innovation System and other review processes.

RESEARCH AND DEVELOPMENT

R&D, innovation and competitiveness

As the linchpin of both product and process innovation, R&D is central to improving the competitiveness and sustainability of Australia's automotive industry. In particular, competitive levels of R&D expenditure can support initiatives that will help provide the Australian industry with innovative technologies and products with which to win new export markets and become a significant player in the pivotal new arena of green and fuel-efficient vehicle technologies. This is even more important given that the Australian industry cannot compete with the wage costs in emerging countries such as China and Thailand. Thus, as stated in the joint submission to the Review from trade unions represented in the industry, the nexus of R&D and innovation is the key to sustaining an internationally competitive automotive industry based on high-skill and high-wage jobs.[7]

As the Federal Chamber of Automotive Industries noted in its submission to the Review:

> *Innovation is not just about R&D. There are many other elements that go into innovation whether it has to do with improved products, better production processes and more effective organisational and supply chain methods.*

This section, however, largely focuses on R&D, which is relatively easy to measure and for which there is a large amount of reliable data.

BERD and human resources devoted to R&D in the Australian automotive industry

Business expenditure on research and development (BERD) by the Australian motor vehicle and parts manufacturing sector grew by an annual average rate of 7.48 percent over the last decade to reach $654 million in 2005–06 (see Figure 6.1).[8] This represented nearly 17 percent of total manufacturing BERD. In addition, the R&D intensity of the automotive industry was 11.6 percent in 2005–06.[9] This is about three times higher than for manufacturing as a whole and about nine times higher than for the Australian economy.[10]

About 89 percent of the automotive sector's BERD was for experimental development, there being very little pure or basic strategic research. This suggests that the Australian automotive industry is focused on product development as opposed to the development of new technologies.

Automotive industry expenditure on R&D has increased since 2001, when ACIS commenced. In 1999–2000, the last full financial year before ACIS commenced, industry expenditure on R&D was $347.9 million.[11] By 2005–06, industry R&D expenditure had increased by $306.3 million to $654.2 million. ACIS R&D assistance in 2005–06 was $146.7 million (see Table 6.1).

5 Refer to http://www.dfat.gov.au/trade/export_review/index.html for further information.

6 Refer to http://www.garnautreview.org.au/domino/Web_Notes/Garnaut/garnautweb.nsf for further information.

7 Federation of Vehicle Industry Unions et al., *Submission to the 2008 Automotive Review*, 2008, p. 24.

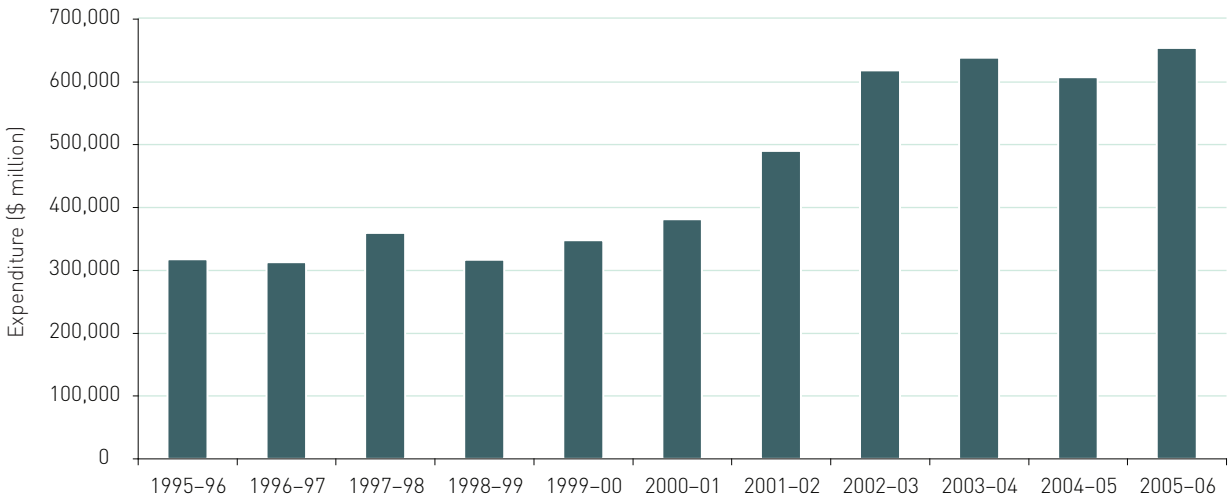
8 Australian Bureau of Statistics, *Research and Experimental Development, Businesses, Australia, 2005–06*, cat. no. 8104.0; and unpublished ABS data, cat. no. 8104.0, ABS, Canberra, 2008. It should be noted that the ABS uses the OECD definition of R&D, which is much narrower than the definition of R&D used for ACIS.

9 R&D intensity is measured by BERD as a proportion of industry value added.

10 The ACIS definition of R&D is broader than the ABS definition of BERD. For example, under the ABS BERD definition, R&D expenditure funded by a business, but performed wholly by another entity on its behalf, is not included. Under ACIS, such R&D expenditure is allowed so long as the business contributes to the direction of the R&D undertaken. Other examples of activities that are classified as R&D under ACIS but not BERD include costs associated with obtaining industrial property rights, costs for supporting R&D (for example, administrative staff or associated overheads), industrial engineering, and engineering design "necessary for the implementation of new or improved products or services and the commercial use of new or improved processes". For more detail, refer to *ACIS Administrative Regulations 2000*; ABS cat. no. 8104.0, *Research and Experimental Development, Businesses, Australia, 2005–06, Explanatory Notes*; and the OECD's *Proposed Standard Practice for Surveys of Research and Experimental Development* ('Frascati Manual'), 2002.

11 ibid.

Figure 6.1. Australian automotive industry R&D expenditure, 1995–96 to 2005–06[12]



Note: R&D expenditure is in current prices and is for ANZSIC Industry Group 281, Motor Vehicle and Part Manufacturing.
Source: Department of Innovation, Industry, Science and Research (2008).

One area of concern is that the growth of automotive R&D expenditure has flattened out in recent years (see Figures 6.1 and 6.2). Whereas annual growth of R&D expenditure in motor vehicle and parts manufacturing averaged about 18.5 percent in the period from 1999–2000 to 2002–03, the figure for 2003–04 to 2005–06 was only 2 percent. This may be partly due to the lumpiness of R&D expenditure in the motor vehicle industry, which, like investment more generally, is shaped by the long lead-in times for the design, development and release of new models. International competition for investment in an R&D-intensive industry may also be a factor.

These comparisons suggest that ACIS funding could benefit from retargeting and streamlining towards more innovative research to encourage further growth in automotive industry BERD.

As discussed above, the automotive sector is one of the largest contributors to R&D spending in Australia. The sector consequently employs a significant number of staff in R&D-related activities. For example, Holden's regional design and engineering centre employs around 1,000 designers, engineers and technical staff. In total, the automotive sector employed 3,307 researchers, technicians and other supporting staff to undertake R&D in 2005–06. This is considerably higher than any other sector within manufacturing. It is also 73 percent higher than a decade ago and shows greater growth in human resources devoted to R&D than for all businesses combined—the latter up by 58 percent over the past 10 years. In the past decade there has been a significant change in the mix of R&D employment in the automotive industry, with researchers now accounting for nearly 60 percent of all human resources devoted to R&D; in 1995–96 the figure was 44.5 percent. Moreover, in 2005–06, 17.8 percent of human resources in the manufacturing sector devoted to BERD were employed in motor vehicle and parts manufacturing.[13]

Appendix D provides further information on BERD in the automotive industry.

International comparisons

The automotive industry is one of the largest investors in R&D and is often ranked with other technology-intensive industries such as pharmaceuticals, information technology and electronics. In Western Europe the automotive industry accounts for around 30 percent of total business R&D. In 2006, four of the world's largest corporate spenders on R&D were motor vehicle manufacturers.[14]

R&D expenditure in the Australian automotive industry accounts for about 6.5 percent of total BERD. This figure is significantly below the corresponding figures for a number of other countries, such

12 Department of Innovation, Industry, Science and Research, *Key Automotive Statistics 2007*, DIISR, Canberra, 2008. R&D expenditure is in current prices and is for ANZSIC Industry Group 281, Motor Vehicle and Part Manufacturing.

13 ibid.

14 FCAI, *Submission to the 2008 Automotive Review*, 2008, p. 46.

as Germany (32 percent), the Czech Republic (26 percent), Sweden (19 percent), and Japan, France and the Republic of Korea (all 15 percent). These figures reflect the operations of major automakers located in those countries and their propensity to maintain core R&D at home.[15]

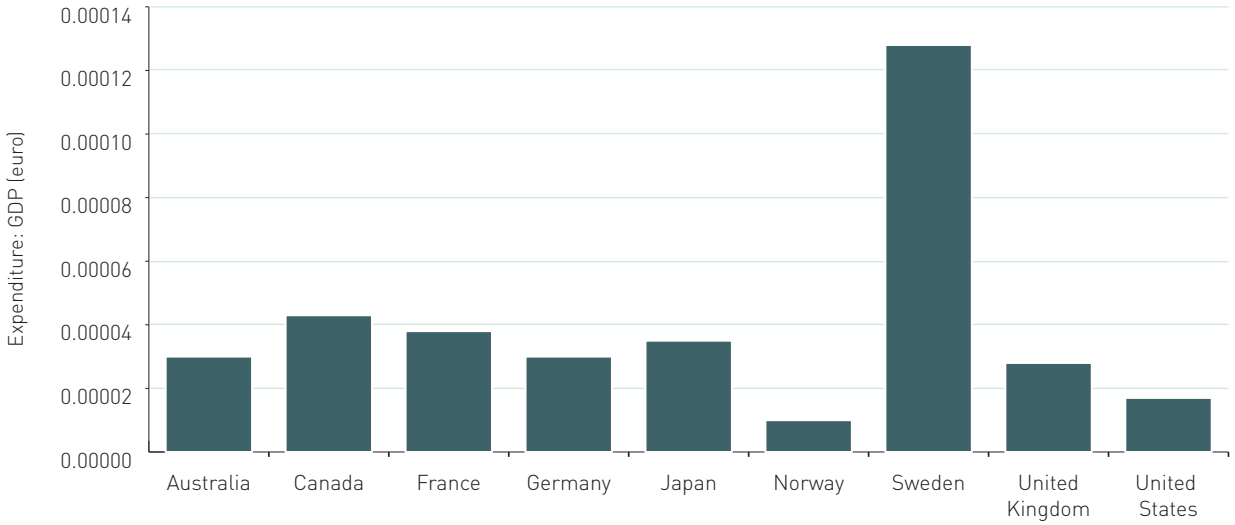
Australia's provision of government assistance for automotive R&D appears to be similar to that of other countries, with the exception of Sweden (see Figure 6.2). Compared with most other developed countries, government in Australia actually contributes a significantly greater proportion to the total R&D expenditure of its automotive industry. However, as the Federation of Automotive Products Manufacturers noted in its submission to the Review, while expenditure "relative to the size of the automotive industry is high, the absolute level, while creditable, is low, compared to that in other countries, such as the US or Japan".[16] In addition, GM Holden's submission to the Review stated that Australia is lagging behind other developed countries in the key area of support for R&D.[17]

GOVERNMENT ASSISTANCE FOR INNOVATION

The Australian Government provides strong support for innovation and R&D through a range of assistance measures. In 2006–07, support for business R&D and its commercialisation accounted for one-third of total budgetary assistance to industry.[19] ACIS and AutoCRC (the Cooperative Research Centre for Advanced Automotive Technology) are the only innovation assistance programs specific to the automotive industry.

Table 6.1 shows the Australian Government's budgetary assistance provided to the automotive industry. This "level of assistance provided to automotive R&D accounts for 13 percent of total business sector innovation support (and will rise to 20 percent in 2006–07)."[20]

Figure 6.2. Mean annual government funding for automotive sector R&D as a proportion of gross domestic product, 2002–2008[18]



Source: FAPM (2008).

15 National Science Board, *Science and Engineering Indicators 2008*, Volume 1, National Science Foundation, Arlington, VA, 2008, pp. 4–43, available at http://www.nsf.gov/statistics/seind08/
16 FAPM, *Submission to the 2008 Automotive Review*, p. 50.
17 GM Holden, *Submission to the 2008 Automotive Review*, p. 36.
18 FAPM, op. cit., p. 50.
19 Productivity Commission, *Trade and Assistance Review 2006–07*, PC, Canberra, 2008 at 3.2.
20 Productivity Commission, *Public Support for Science and Innovation*, Research Report, Productivity Commission, Canberra, 2007, p. 439.

Table 6.1. Australian Government's R&D assistance to motor vehicles and parts manufacturing, 2005–06 and 2006–07

Program/Scheme	2005–06 ($ million)	2006–07 ($ million)
Commercial Ready Program*	1.3	2.2
COMET program	<0.1	0.1
Cooperative research centres	4.6	5.1
Premium R&D tax concession	5.4	7.5
Pre-seed fund	0.3	0.0
R&D Start	<0.1	0.0
R&D tax concession	14.3	15.5
ACIS	146.7	168.9
MVP R&D Scheme	6.7	12.0

* The Australian Government closed the program effective from 14 May 2008.

Sources: For ACIS and the MVP R&D Scheme, DIISR (2008), The Australian Government's 2008–09 Science and Innovation Budget Tables (Table 3); for all others, Productivity Commission (2007), *Trade & Assistance Review 2006–07*, PC Canberra, April (Table 3).

Automotive Competitiveness and Investment Scheme

As discussed in Chapter 4, the Automotive Competitiveness and Investment Scheme (ACIS) provides the automotive component producers, automotive machine tool and tooling producers and automotive service providers with import duty credits based on the value of investment in approved R&D. In addition, recipients can receive ACIS credits for investment in plant and equipment, an important source of technology uptake.

ACIS also includes the motor vehicle producer (MVP) R&D Scheme, which is directed at encouraging Australian MVPs to invest in high-end R&D technologies, while collaboration and improvements in the supply chain are supported by government and industry through the $7.2 million Supplier Development program. This program is complemented by initiatives such as Automotive Supplier Excellence Australia (ASEA), a collaborative effort involving government and industry that aims to develop a prioritised sector-wide set of initiatives to raise supplier capabilities to a globally competitive standard. ASEA is discussed further in Chapter 9.

Several examples raised in submissions to the Review demonstrate that ACIS funding is leading to R&D that would not have otherwise taken place. The Federation of Automotive Products Manufacturers (FAPM) conducted a study of its members in 2008 and found that ACIS is responsible for driving 73 percent of participant company expenditure in R&D, which suggests a high level of additional R&D flowing directly from ACIS.[21]

In its submission to the Review, Futuris noted that ACIS allows the firm to spend approximately 6 to 7 percent of annual sales on R&D activities, compared with 1 to 2 percent before ACIS existed. As a result, Futuris has used ACIS to fund a range of R&D projects that might not have otherwise occurred, including an R&D centre in Melbourne for its global operations. Futuris believes that without ACIS funds this facility would have been established in China.[22]

ACIS support has allowed Continental Pty Ltd to send its employees on training sessions to upgrade their skills and knowledge base. Continental notes that this has led to improvements in the skill level of the R&D department over the last few years.[23]

GM Holden's role as the centre of expertise for GM's global rear-wheel-drive vehicle development has led to a number of significant programs being undertaken, which are eligible for R&D credits. Toyota and Ford also have design and engineering facilities.

The Productivity Commission has been less enthusiastic about the inducement effects of ACIS but noted that it was difficult to draw definitive conclusions. On the one hand, the Commission noted the strong growth in automotive R&D since the inception of ACIS and survey data from the automotive industry on the importance of ACIS to that result. On the other hand, the Commission noted that some of the activity supported, involving modification of existing products and processes, is likely to have been undertaken without public support and that R&D in manufacturing generally had increased over the period ACIS applied. The Commission also noted that the support provided by R&D incentives needed to be weighed against the economic benefits to Australia associated with the transition to a lower automotive tariff environment.[24]

Overall, the indications are that ACIS needs to be retargeted to encourage further growth in automotive industry R&D. Furthermore, eligible R&D supported by ACIS could be streamlined to properly reflect R&D activities at the innovative end of the spectrum and so facilitate greater additionality. Recommendations for changing ACIS are addressed in Chapter 11.

21 FAPM, *Submission to the 2008 Automotive Review*, p. 59.
22 Futuris, *Submission to the 2008 Automotive Review*, p. 28.
23 FAPM, *Submission to the 2008 Automotive Review*, p. 76.
24 Productivity Commission, *Public Support for Science and Innovation*, Research Report, Productivity Commission, Canberra, 2007, pp. 439–440.

Cooperative Research Centre for Advanced Automotive Technology

The Cooperative Research Centre for Advanced Automotive Technology (AutoCRC) aims, through strategic industry-led research collaborations, to deliver improved manufacturing and vehicle technology for Australia's benefit. Its participants are eight leading vehicle and component manufacturers, two state governments and 10 research institutions. The Australian Government, industry, universities and state governments, have provided joint funding of $100 million over seven years.

MVPs, especially GM Holden, have been highly involved in the AutoCRC program. GM Holden currently has 18 research projects under way, involving 10 different research organisations. Many of these AutoCRC projects are already generating valuable intellectual property, and some are moving to the implementation phase. These projects include work on advanced fastening processes, ergonomic modelling, voice recognition systems and virtual reality tools for assembly-line operator training.[25]

Innovation Councils

As part of its election platform in 2007, the Labor Party announced that it would establish a series of Innovation Councils in the second half of 2008. These councils will act as key advisory bodies to government and as innovation advocates on a range of matters. Members will be drawn from leaders in innovation, business, unions, professional organisations, science and research agencies and government.

The councils will also have an important role in linking activities across the innovation community, including the Australian Government's Enterprise Connect Network (discussed later in this chapter).

R&D tax concession

The R&D tax concession is an ongoing scheme designed to increase the level of R&D being conducted by Australian companies. It is broad based, not industry specific, and market driven, with the applicant entity deciding on the scope and timing of the R&D. The scheme offers a tax deduction of 125 percent of expenditure incurred on R&D activities (or a 175 percent premium under the R&D incremental tax concession). An 'R&D tax offset' (equivalent to the value of the R&D tax concession) is available to companies with an annual turnover of less than $5 million.

In its submission to the Review, FAPM noted that the R&D scheme is not industry specific and provided inadequate levels of funding for R&D.[26] GM Holden, on the other hand, believes that the R&D tax concession is an important incentive for encouraging R&D and its scope should be expanded.

Commercialising Emerging Technologies

Commercialising Emerging Technologies (COMET) is a competitive, merit-based program that supports early-growth stage and spin-off companies in successfully commercialising their innovations. COMET provides grants of up to $64,000, successful applicants being required to work with a COMET business adviser to develop and implement an assistance plan through third-party specialist service providers.

Enterprise Connect

Enterprise Connect provides support to Australian small to medium-sized enterprises to help them become more innovative, efficient and competitive. It is designed to help the enterprises acquire the knowledge, tools and expertise to improve productivity, increase competitiveness, and fully capitalise on their growth potential. Enterprise Connect comprises two components—manufacturing centres and innovation centres. Together, they provide a national network of services and support for eligible small to medium-sized enterprises to access expert practical advice and support tailored to their individual firms.

SPILLOVERS[27]

A key rationale for these assistance measures is that the benefits from increased innovation in the automotive sector will 'spill over' into other areas of the economy. Spillovers take different forms, including transfers of knowledge, product innovation, production techniques and management techniques.

Spillovers from automotive manufacturing are the result of the well-established links between the industry and other activities. For example, the tooling industry works extensively in the automotive industry but also provides tooling services to a range of other industries and sectors, including rail, aerospace, marine and defence. Any knowledge or efficiency

25 GM Holden, *Submission to the 2008 Automotive Review*, p. 63.

26 FAPM, *Submission to the 2008 Automotive Review*, p. 51.

27 Spillovers, in a strict economic interpretation, may imply that the benefits are free to other areas of the economy. In some cases, the expansion of automotive skills into other sectors is done on a commercial basis. This section illustrates the impact that the automotive sector has on the economy beyond its intermediate suppliers.

gains from working in the automotive sector will be applied in their work in these other sectors.

Spillover studies

The level of spillovers from the automotive sector is difficult to quantify. The Review commissioned two studies aimed at identifying the nature of spillovers from the automotive industry. First, a study was commissioned that used the number of patent citations as a measure of interfirm spillovers. Spillovers were measured by determining how many automotive sector patents were cited by other patents in the automotive industry and in other industries.

The study found that the automotive industry itself and the machinery and equipment sector receive about three-quarters of spillovers. Significant spillovers also arise for 'automotive-using' industries such as land transport, sales of motor vehicles and private households. The study found that spillovers from the automotive sector affect a relatively small number of other industries. It should be noted that patent citations cannot measure all spillovers. The outcomes of the study are discussed further in Chapter 11, and the full text of the study is at Appendix E.

Another study was commissioned to provide examples of automotive spillovers in practice. Seven firms from the automotive industry (whose work included tooling, component manufacturing and design) were the subject of case studies that identified any spillovers, examined the nature of these spillovers and why they occurred, and finally looked at the question of whether there were any impediments to spillovers occurring.

These case studies found that the automotive industry is competitive, uses advanced technology and produces on a large scale. Such an environment is conducive to high levels of innovation. This, coupled with the automotive industry's extensive links with other industries, has led to extensive knowledge spillovers to other parts of the economy. The case studies also identified a range of common spillovers, including transfer of labour and skills, transfer of high-tech engineering and design capabilities, and the uptake of lean management principles (such as 'just-in-time' principles used by the MVPs). Some impediments to spillovers that were identified included lack of information when entering new sectors and industry barriers to new participants (especially in the defence industry). The case studies are discussed further in Chapter 11 and detailed at Appendix F.

Automotive spillovers reflect the important links the industry has to the heavy engineering sector of the economy: it is the largest industry in the sector, one that requires globally competitive standards in products and processes and one that has subsidiaries of major international companies. The automotive industry is integral to Australia's capabilities in elaborately manufactured goods.

An industry perspective on spillovers

Several submissions to the Review also provided examples of spillover benefits from the automotive industry.

In terms of management spillovers, the benefits of the Toyota production system were raised by several submissions. This system is seen to be driving efficiency and productivity across the automotive industry and a range of other industries. For example, OzPress produces parts for the Toyota Camry and Aurion. Its experience with Toyota has led to improved manufacturing procedures, which are being used in work for Victa lawnmowers. GM Holden notes that since the late 1980s the "the local vehicle assemblers have been at the forefront of diffusing lean manufacturing technologies within Australia".[28] This role is particularly important given that FAPM identified the lack of management skills in the automotive sector as an area requiring improvement.[29]

The truck assembly industry is a major recipient of spillovers from the automotive sector. The automotive components sector, as well as supplying components for the passenger motor vehicle industry, also supplies to the Australian truck industry.[30] Effectively, the truck assembly industry and its approximately 17,000 employees derive a spillover benefit from the skills and expertise of the Australian automotive components sector. These benefits in turn flow on to other sectors in the economy, especially the resources industry, which is able to leverage off a localised and competitive truck industry.

The high product and process standards required to be competitive in the automotive sector also lead to spillovers into important industries such as heavy engineering. Firms in the heavy engineering or machinery sectors must abide by rigorous standards such as those set by MVPs and Tier 1 producers. These standards improve the standard of work heavy engineering firms do for other manufacturing industries. In this way the automotive sector is critical

28 GM Holden, *Submission to the 2008 Automotive Review*, p. 52.
29 FAPM, *Submission to the 2008 Automotive Review*, p. 45.
30 Truck Industry Council, *Submission to the 2008 Automotive Review*, p. 2.

in building Australia's capabilities in producing elaborately transformed goods.

In terms of improved product quality and innovation, Futuris noted that formal accreditation systems such as QS9000, ISO14001 and TS16949 have been implemented in the automotive industry and are being implemented across a range of industries.[31]

The automotive industry's engineering and skills base can also provide a national training ground for many manufacturing and engineering employees in diverse industries. The University of Melbourne case study provides a good example of this type of spillover. The University's Department of Mechanical Engineering provides education and training on mechanical engineering and also conducts research within the automotive sector. The case study shows that the knowledge gained from research and education on the automotive subject matter can lead to significant knowledge spillovers. For example, students can take the knowledge gained from working with automotive-related technologies such as combustion and aerodynamics and apply this knowledge to work in other sectors such as aerospace and transport.

SUMMARY OF FINDINGS

- The level of automotive industry R&D expenditure has plateaued in the last few years, while R&D expenditure in the total manufacturing sector has grown significantly.
- Australia's provision of government R&D assistance funding to its automotive industry relative to GDP is similar to that of most other countries.
- Indications are that ACIS needs to be retargeted to encourage further growth in automotive industry R&D. Furthermore, eligible R&D supported by ACIS could be streamlined to properly reflect R&D activities at the innovative end of the spectrum to facilitate greater additionality.
- There are numerous examples of spillovers from the automotive industry to other sectors in the economy. For example, Australian automotive component producers provide the necessary skills and knowledge to allow the truck assemblers to supply the growing resources industry. These spillovers support the contention that the automotive sector is an important component of Australia's machinery and equipment capability.

31 Futuris, *Submission to the 2008 Automotive Review*, p. 45.

CHAPTER 7: MARKET ACCESS

INTRODUCTION

Access to overseas markets is critical to achieving increased exports and hence enhancing the growth prospects of the Australian automotive industry. Export opportunities for Australian vehicles and parts are constrained by several factors, including trade barriers, investment attraction incentives which encourage foreign direct investment rather than supply through exports, and the global sourcing policies of the major vehicle and component producers.

Market access opportunities exist for the Australian automotive industry through the extension of trade liberalisation through multilateral and bilateral trade agreements. These agreements can also lead to increased "cooperation in areas such as standards, customs procedures, services, protection of investments and intellectual property".[1]

TRADE BARRIERS

Most countries impose tariffs on the importation of automotive goods, as discussed in Chapter 5. These tariffs act to increase the market price of imported vehicles and parts, and act as a support mechanism for domestic automotive industries as well as a source of revenue. They increase prices to consumers.

In some countries, there are other trade barriers in addition to tariffs, such as import licensing and approved permits (which are akin to quotas). Lack of transparency in customs procedures and the gazettal of the value of imported cars for the purposes of determining import duties are characteristics in some countries. These act to constrain vehicle imports into these markets, including from Australia. In its submission to the Review, the Federation of Automotive Products Manufacturers (FAPM) detailed a range of non-tariff barriers imposed by major trading partners. These are discussed later in this chapter.

The removal of trade barriers is important to Australia, which already has an open and competitive automotive market, with some of the lowest barriers to entry amongst automotive producing economies. As noted by the Federal Chamber of Automotive Industries (FCAI), "developing export business is of central importance for the Australian car manufacturers as they seek to position themselves within global networks of their parent companies and to achieve the necessary scale of production to be internationally competitive".[2]

INVESTMENT ATTRACTION INCENTIVES

Most major automotive-producing countries complement their tariff regimes with policies to protect and foster the development of a domestic automotive industry. In many instances, these policies are accompanied by specific investment incentives. These incentives are aimed at attracting automotive firms to establish operations within a country rather than to export to that market. On the other hand, some firms export to a market before relocating there so as to better service the vehicle assemblers and Tier 1 companies. The investment incentives can

1 DFAT, *Submission to the 2008 Automotive Review*, p. 4.

2 FCAI, *Submission to the 2008 Automotive Review*, p. 30.

then constitute a subsidy to a firm that would have undertaken the direct investment anyway. These foreign investments can also help the local industry gain further contacts in overseas markets as well as demonstrate the industry's capabilities.[3] It may also help in 'pulling through' these companies' suppliers into international markets. For example, TriMotive, a company that produces components for 1-tonne pickups, has established manufacturing operations in Thailand to tap into the booming Asian market. This has allowed it to also expand its Australian operations, as its quality control, R&D and business relations management are located here.[4]

The Australian Automotive Aftermarket Association (AAAA), in its preliminary submission to the Review, said that "many Governments were strengthening trading blocs, aggressively chasing new investment and formulating a raft of non-tariff measures to protect and grow their local industries".[5]

MULTILATERAL AND BILATERAL TRADE NEGOTIATIONS

Multilateral trade liberalisation is preferable to bilateral trade liberalisation in that the former encompasses all countries rather than promoting restricted economic integration. In addition, free trade agreements, being agreements between member countries only, discriminate against non-member countries. Nevertheless, in the absence of multilateral trade reform, these agreements can be a second-best policy approach and can complement multilateral trade reforms.

WORLD TRADE ORGANIZATION DOHA DEVELOPMENT AGENDA

The World Trade Organization launched the Doha Development Agenda (DDA) in 2001. The DDA is a round of trade negotiations that comprises further trade liberalisation and new rule-making, underpinned by commitments to strengthen substantially the assistance to developing countries. The successful conclusion of the DDA could lead to improved market access for Australian goods and services, including automotive products and design and engineering services. It could also lead to the introduction of a consistent set of trade rules, lowering administrative costs to firms and government.

The main impact on market access from a successful conclusion to the DDA comes from the application of the Swiss formula. Under the Swiss formula, the size of a tariff reduction is determined by the coefficient used. It works by setting a new bound rate for a tariff. A country's applied rate cannot be above the bound rate. For example, Australia's bound rate on passenger motor vehicles is 40 percent and the applied rate is currently 10 percent.[6] The Department of Foreign Affairs and Trade's submission to the Review reported that the most recent draft negotiating text suggests a coefficient of between seven and nine would be used. This would mean that for Australia applied tariffs would have to be reduced to somewhere within a range of 4.1 to 7.6 percent for automotive parts and 6.6 to 8.8 percent for passenger vehicles. However, it should be noted that "these tariffs would not reach these levels until 2015, assuming the Doha outcome is implemented from 2011 and phased in over five annual instalments, which seems reasonably likely but is yet to be agreed".[7]

While Australia's automotive tariffs would be reduced under the DDA, so would those of other economies including the European Union, the United States, Canada, the Republic of Korea and so on. A key concern, however, is the treatment to be afforded emerging economies, including the emerging automotive-producing nations such as China, India and Thailand. These economies may be able to apply a different coefficient of between 19 and 23, allowing them to maintain their automotive tariffs at more than double those applying in developed economies. In addition, a number of these economies may be able to shield their automotive sectors from the full effects of a tariff cut under special and differential treatment provisions. It is this concern that prompted the FCAI to report that "as a consequence it is likely that even a successful outcome from the Doha negotiations will reinforce a significant competitive advantage for automotive producers in developing countries, such as Thailand, China and India".[8]

Notwithstanding this, the successful conclusion to the DDA would stimulate growth in Australia's trade and economy, which would have positive benefits for Australia's automotive industry. It would also mean that, in the long term, any further multilateral trade

3 Futuris, *Submission to the 2008 Automotive Review*, p. 21.
4 Harcourt, T, *The Cat Empire rules Geelong with a touch of Siamese*, Economist's Corner, 17 October 2007, viewed at www.austrade.gov.au/economistscorner
5 AAAA, *Preliminary submission to the 2008 Automotive Review*, p. 7.
6 The Swiss formula works by setting a new bound rate for a tariff. A country's applied rate cannot be above the bound rate. Under the Swiss formula, with a coefficient of 10, Australia's new bound rate for PMVs would be (10*40%)/(10+40) = 400/40 = 8 percent.
7 DFAT, Submission to the 2008 Automotive Review, p. 16.
8 FCAI, Submission to the 2008 Automotive Review, p. 31.

negotiations would start with tariffs at a lower rate than those applying for the current negotiations.

WORLD TRADE ORGANIZATION ACCESSIONS

There are currently 29 countries seeking accession to the WTO, including Russia. Membership usually results in lower tariffs and the removal of other trade barriers such as local content provisions and quotas. The successful accession of these countries could improve market access for all automotive producers and service providers, including those from Australia.

However, there is concern that some economies may be stepping back from their WTO accession commitments. For example, as part of its automotive policy, China introduced the *Measures on the Importation of Parts for Entire Automobiles*.[9] Several economies, including the United States, the European Union and Canada, have raised the issue in the WTO. In addition, Vietnam raised its tariff on passenger motor vehicles from 70 to 83 percent on 22 April 2008. The reason cited for this increase was to reduce congestion and the trade deficit.

ASIA–PACIFIC ECONOMIC COOPERATION

APEC comprises 21 member economies from the Asia–Pacific region and aims to facilitate economic growth, trade and investment in the region. In 1994 member countries agreed to the Bogor Declaration of free and open trade and investment in the region, by 2010 for developed economies and 2020 for developing economies. However, APEC has no treaty obligations required of its members and the Bogor Declaration is therefore not binding.

Nevertheless, APEC has been constructive in helping to facilitate improved automotive market access within the region through its Automotive Dialogue. The Automotive Dialogue was established in 1999 to serve as a forum for government officials and senior industry representatives to work together on strategies for increasing integration and development of the automotive sector in the region. Its Market Access Working Group is currently focusing on monitoring and reviewing the implications of efforts to reinvigorate the WTO DDA negotiations (discussed above) and is re-examining the implications of different 'rules of origin' regimes in regional and free trade agreements (FTAs) for the automotive industry in the Asia–Pacific region. This also includes consideration of the prospects and potential advantages of increased harmonisation of these arrangements.

FREE TRADE AGREEMENTS

Market access opportunities exist for the Australian automotive industry through the extension of FTAs to non-FTA partner countries, especially those countries with high trade barriers. FTAs can also help improve Australia's competitive advantage in major markets. In addition, FTAs lead to expanded economic growth, which can create jobs and improve consumer welfare. This growth has a flow-on effect to the local automotive industry. FTAs are an important pillar of trade policy and complement multilateral initiatives.

Australia has entered into FTAs with New Zealand, Singapore, Thailand and the United States. Neither New Zealand nor Singapore is a major automotive-producing country. Australia is currently negotiating FTAs with ASEAN–NZ, Chile, China, the Gulf Cooperation Council, Malaysia and Japan. FTAs under consideration include those with India, Indonesia, Mexico and the Republic of Korea.

However, while FTAs generally have a positive effect on the economy and consumers, some of them may have an adverse impact on the Australian automotive industry. For example, while the FTA with Thailand has benefited consumers of vehicles that are similar to those sourced from Thailand through lower prices, and has helped the Thai automotive industry in particular through a near doubling of automotive imports from Thailand, the post-entry-into-force changes to Thailand's excise arrangements have effectively restricted access to that market for Australian-made vehicles such as the Ford Territory (see the section on the Thailand–Australia FTA below).

Australia–China FTA

The *Australia–China Free Trade Agreement Joint Feasibility Study*[10] indicated that trade liberalisation could increase Australia's GDP by $24.4 billion in

9 US Trade Representative, *National Trade Estimate Report on Foreign Trade Barriers*, USTR, Arlington, 2008, p. 80. The report also notes that "the rules require all vehicle manufacturers in China that use imported parts to register with China's Customs Administration and provide specific information about each vehicle they assemble, including a list of the imported and domestic parts to be used, and the value and supplier of each part. If the number or value of imported parts in an assembled vehicle exceeds specified thresholds, the regulations imposed on each of the imported parts a charge equal to the tariff on complete automobiles (typically 25 percent) rather than the tariff applicable to automotive parts (typically 10 percent)".

10 Department of Foreign Affairs and Trade, *Australia–China Free Trade Agreement Joint Feasibility Study*, DFAT, Canberra, March 2008, p. 131, viewed at http://www.dfat.gov.au/geo/china/fta/feasibility_full.pdf

present-value terms over the period 2006 to 2015. Australia's merchandise exports to China were expected to increase by around $4.3 billion in 2015 or 15 percent above 'baseline'. However, the report notes that independent modelling shows that, under a possible FTA, Australia's motor vehicle and parts manufacturing sector would experience small falls in both employment and output.

China's tariff on vehicles and automotive accessories were reduced to 25 percent and 10 percent (average level) respectively on 1 July 2006.[11] In its submission to the Review, FAPM noted that China has high non-tariff barriers to entry such as local content requirements, discriminatory taxation and administrative hurdles.[12]

Thailand–Australia FTA

Under the Thailand–Australia FTA (TAFTA), which came into force at the beginning of 2005, Australia reduced its passenger vehicle and light commercial vehicle tariffs to zero and will reduce the tariffs on components to zero by 2010. Thailand reduced its tariffs on passenger vehicles with an engine capacity of more than 3 litres and its tariffs on light commercial vehicles to zero. Tariffs on passenger vehicles with an engine capacity of 3 litres or less and components will reduce to zero by 2010.

Since TAFTA came into force, exports of Australian vehicles and parts to Thailand have increased by 18 percent to $75 million. Over the same period, imports of vehicles and parts from Thailand have increased by 89 percent, to over $3.7 billion. Thailand has risen to become the second largest source of Australia's automotive imports, up from fifth position.

Australia's exports of vehicles to Thailand have been constrained through the restructuring of Thailand's excise on motor vehicles, which has increased according to engine size. Although the excise applies ostensibly on a non-discriminatory basis to all exporters, it disadvantages Australian car exporters, which produce only large-engine vehicles. This restructuring occurred shortly after TAFTA began. This issue was raised in several submissions to the Review. Ford, for example, reported that this change in tax structure resulted in the Ford Territory having a 30 percent disadvantage over its main competitors.[13]

Australia–United States FTA

Under the Australia–United States FTA, which came into force at the beginning of 2005, Australia reduced its tariffs on light commercial vehicles and components to zero and will reduce its tariffs on passenger motor vehicles to zero by 2010. In response, the United States agreed to reduce all its automotive tariffs to zero.

Since this FTA began, exports of Australian vehicles and parts to the United States have fallen by 33 percent to $518 million. Much of this, however, is attributable to the cessation of an export program by GM Holden. A new program of exports of the G8 and utility vehicles by GM Holden should reverse this trend. Over the same period, imports of vehicles and parts from the United States have risen by 33 percent to $3.5 billion.

Australia–Japan FTA

The *Joint Study into the Costs and Benefits of Trade and Investment Liberalisation between Australia and Japan* (April 2005) found that, given full and immediate bilateral trade liberalisation between Australia and Japan from 2005, Australia's real GDP would increase by $38.7 billion in net-present-value terms over the period 2005 to 2025.[14] The model further found that Australia's exports to Japan were expected to increase by US$12 billion by 2020. However, production (or output) from the Australian motor vehicle and parts manufacturing sector was expected to decline by 0.4 percent and exports to reduce by 2.0 percent. Imports of motor vehicles and parts from Japan were expected to increase by 6.5 percent. Japan has no tariffs on automotive goods, nor does it apply import restrictions, customs procedures or investment requirements. It does, however, have some specific measures that act as barriers. In its submission to the Review, FAPM reported that a range of strict measures relating to inspections, emissions, vehicle safety, recycling and fleet purchasing all have the effect of deterring exports to Japan.[15]

Australia–Republic of Korea FTA

The *Australia–Republic of Korea Free Trade Agreement Feasibility Study* (April 2008) found that full liberalisation of bilateral trade and investment between Australia and the Republic of Korea from

11 ibid., p. 27.
12 FAPM, *Submission to the 2008 Automotive Review*, p. 27.
13 Ford, *Submission to the 2008 Automotive Review*, p. 41.
14 Department of Foreign Affairs and Trade, *Joint study into the costs and benefits of trade and investment liberalisation between Australia and Japan*, DFAT, Canberra, April 2005, p. 168, viewed at http://www.dfat.gov.au/geo/japan/tef-study/index.html
15 FAPM, *Submission to the 2008 Automotive Review*, pp. 24–25.

2007 would result in an increase in Australia's real GDP of US$22.7 billion over the period 2007 to 2020 in present value terms.[16] Australian exports to the Republic of Korea are expected to increase by 31 percent, or US$7.5 billion, by 2020. The motor vehicle and parts manufacturing sectors in both the Republic of Korea and Australia are expected to grow under the FTA currently being considered. The Republic of Korea applies an 8 percent tariff on passenger motor vehicles and components, and a 10 percent tariff on commercial motor vehicles. Other non-tariff barriers include lengthy administrative delays through customs, imported items luxury tax, taxes for education and subways, and a vehicle tax that is dependent on engine size.

Australia–Gulf Cooperation Council FTA

FTA negotiations with the Gulf Cooperation Council (GCC) commenced at the end of July 2007.[17] The GCC comprises Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates. As discussed earlier, automotive exports to this region are of vital strategic importance to Australia, and were worth $2.2 billion in 2007.

Australia would benefit substantially from an FTA with the GCC that addressed tariffs, which are generally only 5 percent on automotive products, and other barriers to trade in goods. An FTA could address some important trade issues for Australian industry, including customs procedures, technical barriers to trade, non-tariff measures, and a wide range of trade facilitation measures. It would also level the playing field between Australia and those economies that have FTAs with GCC countries, including the United States. An FTA could also build on Australia's advantages in the region. For example, Australia is seen in the region as a tolerant and safe environment for students, with the additional advantage of being English-speaking.

Australia–ASEAN–NZ FTA

In March 2005, negotiations commenced for an FTA involving Australia, New Zealand and ASEAN (comprising Burma, Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, the Philippines, Singapore, Thailand and Vietnam).

Australia's trade to this region is growing rapidly. In the 10 years to 2006, Australia's two-way merchandise trade with ASEAN grew by an average annual rate of 9.5 percent.[18] Automotive trade with the ASEAN region is significant, with exports of $216 million and imports of around $4 billion in 2007. Several submissions to the Review noted that because of this trade imbalance on automotive goods, Australia should proceed with negotiations in this region with caution. However, many of these countries have high tariff and non-tariff barriers to trade, which could be addressed in a comprehensive FTA.

The already high and growing population, combined with income growth, of the ASEAN region also makes this an important potential market for Australian automotive goods and services. Foreign direct investment into Australia in the automotive sector could be facilitated by gaining access to this market.

Australia–Malaysia FTA

In April 2005, Australia and Malaysia agreed to launch negotiations on a bilateral FTA. Malaysia is an important economic partner for Australia and ranks as our third-largest trading partner in ASEAN and our 11th-largest trading partner overall. Trade between the two countries has grown steadily in recent years and in 2006–07 stood at around $11.9 billion. In terms of automotive trade to Malaysia, Australia has a trade deficit of around $74 million. Trade in both directions has declined in the past few years, with exports falling from $30.3 million in 2003 to $11.6 million in 2007. Over the same period, automotive imports from Malaysia fell from $95.2 million to $85.9 million.

A scoping study, coordinated by the Department of Foreign Affairs and Trade, reported that an Australia–Malaysia FTA would increase Australia's GDP by $1.9 billion over the period to 2027. Malaysia's GDP would increase by around $6.5 billion over the same period. Malaysia would gain more as the economy with higher trade barriers and a higher ratio of trade to GDP.[19]

In its submission to the Australia–Malaysia FTA scoping study, the FCAI noted that the Australian automotive industry could make significant gains from this free trade arrangement.[20] Ford Australia

16 Department of Foreign Affairs and Trade, *Australia–Republic of Korea Free Trade Agreement Feasibility Study*, DFAT, Canberra, April 2008, p. 108, viewed at http://www.dfat.gov.au/geo/rok/fta/rok-au-study-report.pdf

17 Department of Foreign Affairs and Trade, 2008, http://www.dfat.gov.au/trade/fta/gcc/

18 Department of Foreign Affairs and Trade, 2008, http://www.dfat.gov.au/trade/fta/asean/aust-trade.html

19 Department of Foreign Affairs and Trade, 2008, http://www.dfat.gov.au/geo/malaysia/fta/

20 FCAI, *Submission to the Australia–Malaysia FTA Scoping Study*, FCAI, Canberra, 2004, viewed at http://www.dfat.gov.au/geo/malaysia/fta/submissions/fcai.pdf

noted that the FTA could address the trade imbalance between the two countries. Both submissions noted that Malaysia has high tariffs on vehicles (up to 300 percent) and a range of prohibitive non-tariff barriers including vehicle excise based on engine capacity and excise exemptions for local producers.

Industry views on prospective FTAs

Most submissions to the Review from industry supported Australia's possible FTAs with the GCC and ASEAN–NZ. The same submissions did, however, argue for a cautionary approach to FTAs with China, Japan and the Republic of Korea. This is because of these countries' capacity and export orientation, and possible adverse affects on the industry. On the other hand, other submissions raised the positive benefits of FTAs to the industry, including improved market access and greater cooperation over technical barriers to trade.

Several submissions, including from GM Holden and Ford, raised the importance of improved market access, and pointed out opportunities with the European Union, Latin America, Russia, South Africa and Brazil. Many of these economies have higher tariffs than Australia. South Africa and the United Kingdom (a member of the European Union) are also right-hand-drive markets, an advantage for Australian vehicle producers.

Feasibility studies are also being undertaken for FTAs with India, Indonesia and Mexico.

Behind-the-border arrangements

FTAs can help in eliminating technical barriers to trade such as standards conformance and certification issues. However, these barriers may not be fully removed in FTA negotiations, or the FTA may not cover some domestic policy-related matters. For example, as noted above, Thailand implemented a new excise tax structure, which acted to heavily disadvantage Australian vehicle exports to Thailand, despite an FTA existing between the two countries.

Other non-tariff barriers identified in economies with which Australia is considering FTAs include import licensing certification, administrative arrangements, domestic taxes, environmental taxes and charges, fleet purchasing policies and customs valuation issues.

A project funded by the Intellectual Property Institute of Australia reports the results of a survey of more than 2,100 Australian enterprises that have business dealings with China. The survey found that "Chinese regulations and legal transparency are of greater importance for their [the Australian enterprises'] Chinese business dealings" than IP issues (for example registration, examination and enforcement). It also found that "among the IP issues covered in the survey, IP enforcement poses the greatest problem for Australian businesses".[21]

Differences in trade rules

While there has been some harmonisation in the trade rules governing FTAs, some differences remain. For example, in Australia's negotiated FTAs, the rules of origin are mostly based on a change in tariff heading (or sub-heading) with an additional regional value content threshold. However, this threshold varies among agreements. Under the Australia–United States FTA, the regional value content is based on a net cost method, whereas under TAFTA it is based on a build down method. In addition, there are different compliance tests in relation to the need for certificates of origin. These differences in trade rules increase administrative costs for importers and exporters alike, and can act as a barrier to trade.

Tariffs as a bargaining lever

It has been suggested that Australia's automotive tariffs could be used as leverage when negotiating FTAs. That is, the tariff should only be given up if a trading partner agrees bilaterally to lower its own tariff. However, bilateral product-specific deals are prohibited under WTO rules. In addition, Australia's applied automotive tariff rates are already low, with the nominal effective rate (that is, tariff revenue/customs value of imports) being below 6 percent for motor vehicles.

Moreover, current negotiations in the WTO under the DDA are aimed at trade liberalisation, and the successful conclusion of these negotiations would help render moot the argument about the use of tariffs as a bargaining lever.

Another consideration is that making the automotive tariff a hostage to trade negotiations ignores the costs to consumers and the advantages to the economy in general of future reforms to Australia's automotive assistance arrangements. In addition, unilateral reductions in tariffs send a positive signal to trading partners about Australia's commitment to trade liberalisation.

21 Leahy, A, MacLaren, D, MacDonald, D, Weatherall, K, Webster, E & Yong, J, *In the Shadow of the Australia–China FTA Negotiations: What Australian Business Thinks about IP*, Intellectual Property Institute of Australia, Working Paper No. 07/07, September 2007, p. 2.

GLOBAL PRODUCTION AND SOURCING POLICIES

Nearly all large Australia-based automotive firms are subsidiaries of multinational companies. As such, Australia-based firms cannot export to international markets if they are constrained by overseas parents. For example, Ford Australia is apparently precluded from manufacturing a left-hand-drive vehicle, which locks it out of many major markets. In addition, many small Australian component producers may be precluded from supplying parts to motor vehicle producers and Tier 1 companies because of supply decisions from their overseas parents based on global tender procedures, particularly since the advent of global vehicle platforms. In addition, the cost of a bid can be between $0.3 and $2 million, which deters many smaller firms from bidding.

INFORMATION FAILURE

Many small automotive component, tooling and service companies may not be able to access global supply chains because of information failure. This can relate to the inability of these small firms to obtain information about global platform developments and a lack of understanding of the tender procedure. It can also relate to a lack of knowledge by global companies of the capabilities of small Australian firms.

ENCOURAGING EXPORTS

The removal of trade barriers is important for improving market access for Australian firms. However, the export performance of the industry may not be fully realised if firms do not have the ability to participate. This is especially true for many Australian-owned firms in the automotive industry which are small, operate in a fragmented environment, do not have the scale to effectively enter new markets and lack information about export or supply chain integration opportunities. These firms can also face the 'tyranny of distance' (that is, Australia's geographic location and distance from markets), which acts as a barrier to export.

Encouraging small firms to collaborate and achieve the scale necessary to win international export contracts enhances the sustainability and competitiveness of the Australian industry. Other benefits include swifter implementation of technological improvements, stimulating companies' internal cost controls, and improvements in productivity. Exporting firms also tend to pay higher wages and salaries than non-exporting firms.

Team Australia Automotive

A submission to the Review from the Industry Capability Network Limited (ICNL) outlined its involvement with Team Australia Automotive.[22] This consortium, an initiative of the Victorian and South Australian governments, component producers and ICNL, aims to overcome the impediments mentioned above. The Team Australia consortium approach also helps the fragmented components industry to create the scale necessary to compete for international contracts.

With funding from the Department of Innovation, Industry, Science and Research, the Team Australia consortium employs a representative in Detroit to market Australian automotive manufacturers to vehicle assemblers and Tier 1 companies. This includes providing information to the initiative's members about upcoming models and platforms, trends in vehicle design and enquiries about possible bids. ICNL reported that the initiative had generated US$4 million in the first 12 months of its operation. Commonwealth funding for the initiative ceases in October 2008. ICNL has recommended funding for an additional five years to continue its operations in North America and to expand the Team Australia model into other countries.

In its preliminary Review submission, the Australian Automotive Aftermarket Association (AAAA) noted that it had launched an exporters' network for members, which provides information, mentoring and seminars to help capture export markets.[23] The AAAA reported that for the industry to take full advantage of export opportunities requires government and industry to work together on a Team Australia approach to common markets, customers and product groupings to assist the industry in taking the next step in its industrialisation process.[24] The AAAA believes that the costs associated with the use of Austrade's services, combined with the restriction on access to the Exports Market Development Grants Scheme, preclude its members from using such programs. The Australian Industry Group's survey results "suggest more could be done by governments to support component companies to explore greater export opportunities. The survey found export development programs to be of limited success".[25]

22 Industry Capability Network, *Submission to the 2008 Automotive Review.*
23 Australian Automotive Aftermarket Association, *Submission to the 2008 Automotive Review*, p. 4.
24 ibid., p. 2.
25 AiG, *National CEO Survey: Driving on Innovation and Competitiveness*, AIG, Sydney, 2008, p. 5.

While there is much merit in such a program, any initiative would have to comply with the rules of the WTO, avoid being an export subsidies program and avoid favouring particular firms.

The Team Australia initiative needs to present a united Australian automotive capability to build recognition in international markets and fully leverage the combined suite of niche capabilities that the Australian automotive industry has to offer. The united approach could encompass state government supply chain and export promotion programs. Furthermore, delivery of the initiative could be contestable to ensure that it is efficient and effective in achieving benefits for the Australian industry.

Automotive ambassador

A related challenge for the Australian automotive industry is to gain access to the decision makers of the major original equipment and Tier 1 component manufacturers, and in government. This could be addressed through a well-known and respected eminent Australian (or Australians) undertaking an ambassadorial role for the industry. The ambassador could 'open doors' for the whole Australian supply chain and assist in promoting the industry in new and emerging markets. The ambassador could also help facilitate trade missions by both government and industry and help to better coordinate such visits across different tiers of government. This initiative would complement related initiatives such as Team Australia Automotive. It would, however, require a concerted and collaborative effort by industry and the various tiers of government.

This ambassadorial role is supported by Futuris and others, who noted in their submissions to the Review that this role would be crucial in promoting Australian industry with established and also emerging and growing motor vehicle producers.[26]

REVIEW OF AUSTRALIA'S EXPORT POLICIES AND PROGRAMS

As noted in Chapter 6, the Australian Government has announced a Review of Australia's Export Policies and Programs.[27] The review will examine Australia's trade performance over the past two decades including factors affecting export growth. The review is chaired by Mr David Mortimer AO, who is supported by Dr John Edwards. A separate research project on Australia's approach to FTAs will be undertaken in parallel with the export policies and programs review, and the results will be incorporated into the review's final report. This research project will, in part, also analyse Australia's most recent FTAs to assess their net benefits.

SUMMARY OF FINDINGS

- Australia's automotive tariffs are among the lowest of automotive-producing countries. As such, the successful conclusion of a comprehensive international trade agreement in which deep cuts are made to global automotive tariffs would improve market access for Australia's automotive products and services and have net benefits for the Australian industry. Of concern, however, is preferential treatment for major emerging automotive economies such as Thailand and China.
- Economies with high trade barriers and where Australia can develop a competitive advantage should be considered as part of Australia's future free trade agreement agenda.
- Many countries maintain non-tariff and other beyond-the-border barriers that restrict market access for Australian automotive goods.
- There is merit in extending funding to an initiative such as Team Automotive Australia, providing it complies with Australia's international trade obligations.

RECOMMENDATIONS

- The successful conclusion of the World Trade Organization Doha Development Agenda should continue to be a principal focus of Australia's trade negotiations.
- The Review of Australia's Export Policies and Programs should give consideration to ways of addressing beyond-the-border issues such as non-tariff barriers as part of future free trade agreement negotiations.
- Australia should continue to enter into free trade agreement negotiations. However, from an automotive perspective, these should be focused on countries with which Australia can develop its competitive advantage or on countries where very high barriers to trade exist. Economies upon which Australia should focus its free trade agreement negotiations include the Gulf Cooperation Council, the Association of Southeast Asian Nations and South Africa.

26 Futuris, *Submission to the 2008 Automotive Review*, p. 17.
27 Refer to http://www.dfat.gov.au/trade/export_review/index.html for further information.

- Trade rules, such as rules of origin, should, wherever practicable, be harmonised across free trade agreements to reduce compliance costs to industry.
- A well-known and respected industry figure or figures should undertake an ambassadorial role for the industry.
  - This should be complemented by medium-term funding for the extension of Team Australia Automotive to new and emerging markets, as part of the Global Automotive Transition Scheme proposed in Chapter 11.
  - Delivery of the Team Australia Automotive initiative should be through a contestable grant process, and present a united Australian automotive capability (encompassing state government supply chain and export promotion programs) to international markets.

CHAPTER 8: ENVIRONMENT

INTRODUCTION

There were 14.8 million motor vehicles (including motor cycles) registered in Australia at the end of March 2007.[1] This is an increase of 1.6 million vehicle registrations since March 2003, which equates to an increase in the number of vehicles per 1,000 residents from 663 to 705. The continued increase in the number of vehicles is adversely affecting the quality of the environment as vehicle emissions contribute to both climate change through the emission of greenhouse gases, and to diminishing the quality of the urban environment through increased air pollutants and traffic congestion.

The impact of motor vehicle travel on the environment is also determined by vehicle type and engine size, the age of the vehicle fleet, distances travelled, the technologies embodied in the vehicle fleet and fuel quality. The manufacture of vehicles and components, as well as the construction of road transport infrastructure, also add to greenhouse gases, while the disposal of old vehicles and parts can adversely affect the environment if done inappropriately. Positive environmental outcomes can be achieved through the use of intelligent transport systems and use of low-emissions transport such as public transport and bicycles.

In 2006, road transport accounted for 68.9 million tonnes (or 12 percent) of Australia's net greenhouse gas emissions. This was 14.5 million tonnes (or 26.7 percent) higher than in 1990. Passenger cars were the largest source of these emissions, contributing 42.6 million tonnes. This was 7.4 million tonnes (or 21 percent) higher than in 1990.[2]

FUEL CONSUMPTION

The Australian car industry has announced a voluntary target of reducing fuel consumption of new petrol-engined passenger cars to 6.8 litres per 100 kilometres by 2010. The average rate of fuel consumption across all Australian-registered vehicles in the year ended 31 October 2006 was 13.8 litres per 100 kilometres, which means the average of the vehicle fleet was less fuel efficient than for the year ended 31 October 2004, when it was 13.6 litres per 100 kilometres. This can be explained by the growth in the sports utility market, which has largely offset improvements in engine technology as far as fuel efficiency is concerned.[3] Given this trend, the voluntary 2010 target presents a very difficult challenge for the automotive industry.

Lowering levels of fuel consumption will assist Australian motorists with the rising costs of fuel. The Australian Conservation Foundation's submission to the Review noted that, at a petrol price of $1.50 per litre, a 6.8 litres per 100 kilometres standard could save the average Australian driver around $1,000 on petrol each year.[4]

1 Australian Bureau of Statistics, *Motor Vehicle Census,* cat. no. 9309.0, ABS, Canberra, 31 March 2007.

2 Department of Climate Change, *National Greenhouse Gas Inventory 2006*, Commonwealth of Australia, Canberra, 2008.

3 Bureau of Transport and Regional Economics, *Information Sheet 18: Fuel Consumption by New Passenger Vehicles in Australia*, BTRE, Canberra, 2002, p. 2.

4 Australian Conservation Foundation, *Submission to the 2008 Automotive Review*, p. 4.

ENVIRONMENTAL CHALLENGES

Kyoto Protocol

On 3 December 2007, Prime Minister Rudd signed the instrument of ratification of the Kyoto Protocol to the United Nations Framework Convention on Climate Change. As part of this agreement, Australia has set a target to reduce greenhouse gas emissions by 60 percent on 2000 levels by 2050.[5] As a comparative figure, a 60 percent reduction in 1990 emissions applied uniformly across the transport sector implies passenger motor vehicle emissions of 14 million tonnes of carbon dioxide in 2050—one-third of current levels.

Australian Design Rules

The Australian Design Rules set the standards that each vehicle model is required to meet. In the environmental context, they set standards for pollutant emissions, noise and fuel consumption labelling. The rules do not mandate the use of particular technology, although it has been necessary for vehicle manufacturers to install particular technologies, such as catalytic converters for light petrol vehicles, in order to meet emissions limits imposed by the rules. The rules for emissions standards have been progressively tightened since they were introduced in 1972.

A national emissions trading scheme

The Australian Government is establishing an emissions trading scheme, to start no later than 2010. The scheme is part of the Government's framework for meeting the climate change challenge. A detailed design of the scheme is to be finalised by the end of 2008.

The Government has outlined five tests for the scheme: it must be a cap and trade scheme to be internationally consistent; it must effectively reduce emissions; it must be economically responsible; it must be fair; and it must recognise the need to act now. A comprehensive emissions trading scheme would include road transport.

Garnaut Climate Change Review

The Garnaut Climate Change Review was initiated by the then Leader of the Opposition, the Hon Kevin Rudd MP, and by the First Ministers of the eight states and territories of Australia. It was commissioned by the First Ministers on 30 April 2007. The Commonwealth joined the Review at the end of 2007.

The Review was required to examine the impacts, challenges and opportunities of climate change for Australia. A draft report[6] was released on 4 July 2008, with a final report due by the end of September 2008.

The draft report provides the Review's suggestions on the design of the emissions trading scheme, which should cover as many sectors as practicable, including transport. This will help ensure that costs are more efficiently shared across the economy.

The draft report advocates the full auctioning of emissions permits and the return of all revenue to households and business. It also proposes that half of the proceeds from the sale of all permits be allocated to households, around 30 percent be provided for structural adjustment needs for business (including any payments to trade-exposed, emissions-intensive industries), and 20 percent be allocated to R&D and the commercialisation of new technologies. The former Prime Minister's Task Group on Emissions Trading also called for the inclusion of transport in the scheme.[7]

Green paper on the Carbon Pollution Reduction Scheme

On 16 July 2008, the Australian Government released its green paper on the Carbon Pollution Reduction Scheme, which is intended to be implemented in 2010. At the heart of the scheme is emissions trading. The scheme will cover transport, but to "offset the initial price impact on fuel associated with the introduction of the Carbon Pollution Reduction Scheme, the Government will cut fuel taxes on a cent for cent basis". This measure will be reviewed after three years. The Government will also cut fuel taxes for heavy vehicle road users on a cent for cent basis. This measure will be reviewed after one year. The Government also announced that it will provide transitional assistance in the form of a share of free permits to the most emissions-intensive trade-exposed industries.[8]

The Australian Government also proposes the establishment of the Climate Change Action Fund to

5 Wong, P (Minister for Climate Change and Water), *It's official, Australia is now part of the Kyoto Protocol*, media release, Canberra, 11 March 2008.

6 Garnaut, R, *Climate Change Review. Draft Report*, Commonwealth of Australia, Canberra, June 2008.

7 Prime Ministerial Task Group on Emission Trading, *Report of the Task Group on Emissions Trading*, Department of Prime Minister and Cabinet, Canberra, 2007, Appendix J.

8 Garnaut, R, *Issues Paper—Forum 5—Transport, Planning and the Built Environment*, Canberra, 2007, p. 4.

facilitate the transition of businesses to a low-carbon economy. It will do this by providing partnership funding for:

- capital investment in innovative new low-emissions processes;
- industrial energy efficiency projects with a long payback period; and
- dissemination of best and innovative practice among small to medium-sized enterprises.[9]

The Government has committed to help households meet the increase in the cost of living flowing from the scheme through measures such as increasing payments above automatic indexation to people receiving pensioner, carer, senior and allowance benefits, increasing assistance to other low-income households through the tax and payments system and providing assistance to middle-income households.[10]

The impact on the cost of living from the scheme will depend upon its coverage and the ambition in relation to reducing emissions. "For illustrative purposes, preliminary modelling of a carbon price of $20 per tonne, introduced in 2010–11, suggests an average increase in the cost of living of around 0.9 per cent."[11]

Other emissions trading schemes, such as the EU scheme, exclude emissions from road transport.[12] The EU scheme captures the manufacturing operations of the automotive industry at a cost of €25 per ton of CO_2 emitted.[13] To reduce emissions from the vehicle fleet, the European Union is considering mandating average new car CO_2 emissions of 130 grams per kilometre,[14] with an additional reduction of 10 grams of CO_2 per kilometre to be achieved through technologies (for example, low-friction resistance tyres). However, a mandatory target of CO_2 emissions per kilometre may not achieve overall reductions in emissions, as there is no incentive to drivers to reduce the number of kilometres travelled. It may also impose costs on the industry that are greater than the costs associated with the inclusion of road transport in the emissions trading scheme. This is because the scheme allows industry to achieve the lowest-cost form of abatement, rather than through the use of technologies to achieve mandated targets. In addition, mandated targets do not address greenhouse gas emissions from older vehicles. As such, a mandated emissions target is a 'second-best' option.

Of concern, however, is the possibility that the introduction of an emissions trading scheme in Australia could lead to a situation where Australia could export its greenhouse gas emissions from vehicle and component manufacture through the purchase of automotive goods from economies without an emissions trading scheme. This would be detrimental to Australian manufacturing and not lead to a reduction in global CO_2-equivalent emissions. While compensation to trade-exposed, emissions-intensive industries may offset the adverse impact on manufacturers, it would not address the latter issue. One method to overcome this could be that importers of automotive goods from economies that do not impose a recognised emissions trading scheme be required to purchase an Australian carbon-equivalent to what the automotive good would have attracted had it been made onshore. This has some administrative difficulties associated with it, such as how to account for components manufactured in economies with an emissions trading scheme.

Industry views on the emissions trading scheme

In their submissions to the Review, most Australian motor vehicle producers supported an Australian emissions trading scheme in principle, as it will allow the market to provide efficient emissions reductions by exploiting least-cost opportunities. However, they also stated that the impact on the Australian automotive industry will be particularly severe for a range of reasons. First, Australia produces large cars, which will likely be replaced by smaller vehicles as the price effects of the scheme are felt.[15] The Australian automotive industry is also highly trade-exposed, with over 80 percent of domestic vehicles imported (including from countries which may not have a comparable scheme). Furthermore, the automotive industry is a heavy energy user, and also is reliant on heavy energy-use sectors such as steel and aluminium.[16] Finally, GM Holden notes that an emissions trading scheme will force a shift to more efficient technologies, which will come at a very large cost to the industry.

In their submissions to the Review, the Federal Chamber of Automotive Industries (FCAI)[17] and Ford[18]

9 Australian Government, *Green Paper Fact Sheet No. 8: Business and the Scheme*, 16 July 2008.
10 Australian Government, *Green Paper Fact Sheet No. 7: Households and the Scheme*, 16 July 2008.
11 Australian Government, *Green Paper Fact Sheet No. 12: Carbon Pollution Reduction Scheme—Price Impacts*, 16 July 2008.
12 Includes Phases 1 to 3 (2005–2020).
13 Toyota, *Submission to the 2008 Automotive Review*, p. 27.
14 PriceWaterhouseCoopers, *The Automotive Industry and Climate Change. Framework and Dynamics of the CO_2 (R)evolution*, PWC, n.p., September 2007, pp. 33–34.
15 FCAI, *Submission to the 2008 Automotive Review*, p. 55.
16 ibid.
17 ibid., p. 56.
18 Ford, *Submission to the 2008 Automotive Review*, p. 39.

support an economy-wide emissions trading scheme (which includes road transport) as it is an efficient mechanism to determine least-cost emissions abatement. However, the FCAI encourages the Government to consider each industry individually, and determine how high-emissions or trade-exposed industries, such as the automotive industry, should be dealt with under an emissions trading scheme.

Furthermore, most Review submissions noted that imposition of emissions targets for new vehicles would be overly burdensome if they were additional to an economy-wide scheme. It would effectively mean the automotive industry would pay more for its emissions than other industries for a similar reduction in overall emissions released into the atmosphere. GM Holden also notes that a mandated CO_2 target could overly inflate the price of vehicles utilising emissions abatement technologies, and actually "drive buying patterns which ultimately may be detrimental to CO_2 [emissions]".[19]

COMPARISONS OF INTERNATIONAL EMISSIONS TARGETS

Efforts to reduce the greenhouse gas emissions from motor vehicles are under way in many parts of the world. Australia, like Japan, has a voluntary emissions target, while the United States has a mandatory emissions target. The European Union is also considering mandating an emissions target. A precise comparison between emissions targets is not possible due to differences in fleet coverage and test methods. Nevertheless, the following section briefly outlines the targets and fleet coverage of some international schemes.

At a national level, the United States has a mandatory corporate average fuel economy standard (CAFE). This has also been adopted as a voluntary industry scheme in Canada. Each car maker is required to achieve an average fuel efficiency standard across all their vehicle models each year. Different standards apply to cars and light trucks. The current CAFE is equivalent to 8.6 litres per 100 kilometres for cars and 11.4 litres per 100 kilometres for light commercial vehicles and sports utility vehicles. As a part of the 2007 Energy Independence and Security Act, the CAFE standard is proposed to be tightened to the equivalent of 6.6 litres per 100 kilometres by 2015 for passenger cars.

In addition, President Bush announced in his January 2007 State of the Union address that he would seek fuel efficiency improvements for cars and light trucks, and support clean diesel fuel, a technology in which EU manufacturers lead the world. At the state level, California—followed by 10 other states—adopted a rule in 2004 that aims for a 30 percent reduction in greenhouse gas emissions from cars and light trucks between 2009 and 2016. Moreover, in 2007, California established a groundbreaking Low Carbon Fuel Standard for road transportation fuels sold in the state. By 2020, the standard will reduce the carbon intensity of California's passenger vehicle fuels by at least 10 percent.[20]

Japan recently announced its intention to further improve car fuel efficiency by 20 percent, which translates into a target of 138 grams of CO_2 per kilometre, by 2015 (see Table 8.1). Japan's fuel efficiency targets encompass both petrol and diesel passenger and light commercial vehicles, using a 'best in class' or 'top runner' approach, in which the standards are based on the best-performing vehicles in each class. For most vehicles, the targets are to be met by each vehicle maker for each vehicle weight class. The majority of Japanese vehicles sold in Japan have already achieved their class standard.

In December 2006, Japan revised its fuel economy targets upward, and expanded the number of weight bins from nine to sixteen. This new standard is projected to improve the fleet average fuel economy of new passenger vehicles from 13.6 kilometres per litre in 2004 to 16.8 kilometres per litre in 2015, an increase of 24 percent. Based on analysis by the International Council on Clean Transportation, the new target equals an average of 125 grams of CO_2 per kilometre on the New European Driving Cycle test.

The European Union is considering a greenhouse gas emissions target of 120 grams of CO_2 per kilometre by 2012, which is the most ambitious in the world. This target will be defined by the average emissions of new cars sold in a given year. How exactly this will be translated at the level of manufacturers and vehicles is yet to be decided.[21] The European Union is considering making this target mandatory because road transport is not included under its emissions trading scheme, and also because the automotive industry's previous target (140 grams of CO_2 per kilometre by 2008) will not be met.

Europe's peak automotive manufacturers association, the European Automobile Manufacturers' Association

19 GM Holden, *Submission to the 2008 Automotive Review*, p. 74.

20 Office of the Governor (California), 'Gov. Schwarzenegger signs executive order establishing world's first low carbon standard for transportation fuels', press release, California, 18 January 2007, viewed at http://gov.ca.gov/index.php?/press-release/5174/

21 IHS, *FAQ on EC Strategy to Reduce CO_2 Emissions from Cars*, IHS, n.p., 8 February 2007, viewed at http://auto.ihs.com/news/eu-en-car-co2-emissions-faq-2-07.htm

(ACEA), has a voluntary agreement based strictly on tackling CO_2 emissions. The agreement calls for a Europe-wide CO_2 reduction to 140 grams of CO_2 per kilometre by 2008.[22]

In 2005, the FCAI established a voluntary target to reduce national average carbon emissions (NACE) for all new vehicles (under 3.5 tonnes) to 222 grams of CO_2 per kilometre by 2010. The NACE has improved continuously since data were first collected—from 252 grams of CO_2 per kilometre in 2002 to 226 grams of CO_2 per kilometre in 2007, a reduction of more than 10 percent—and current trends suggest that this NACE target of 222 grams will be achieved.[23]

Table 8.1. Recent and projected national average carbon emissions (NACE) for all new light or passenger vehicles*

	NACE (latest figure)	Target	Coverage	Code
Australia	226.1g CO_2/km (2007)	222.0g CO_2/km (2010)	New light vehicles < 3.5 tonnes gross mass	Voluntary
EU/ACEA	160.0g CO_2/km	140.0g CO_2/km	Newly registered passenger cars	Voluntary
EU (under consideration)	160.0g CO_2/km (2007)	120.0g CO_2/km (2012)	New passenger vehicles, including SUVs	Mandatory
Japan[24]	165.6g CO_2/km (2004)	138.0g CO_2/km (2015)	Cars and light trucks	Voluntary

* A precise comparison between the European Union and other regulatory regimes is difficult because of differences in fleets and test methods.

Sources: For Australia, http://www.fcai.com.au/media/2008/03/00000156.html; for EU and ACEA, *Squaring the Circle: Emissions Standards in the Car Industry*, Equity Research, December 2005; for EU (under consideration) http://ec.europa.eu/environment/air/transport/co2/co2_home.htm; for Japan, Japan Opts for Integrated Approach, http://www.acea.be/index.php/news/news_detail/japan_opts_for_integrated_approach/.

Fuel types and fuel standards

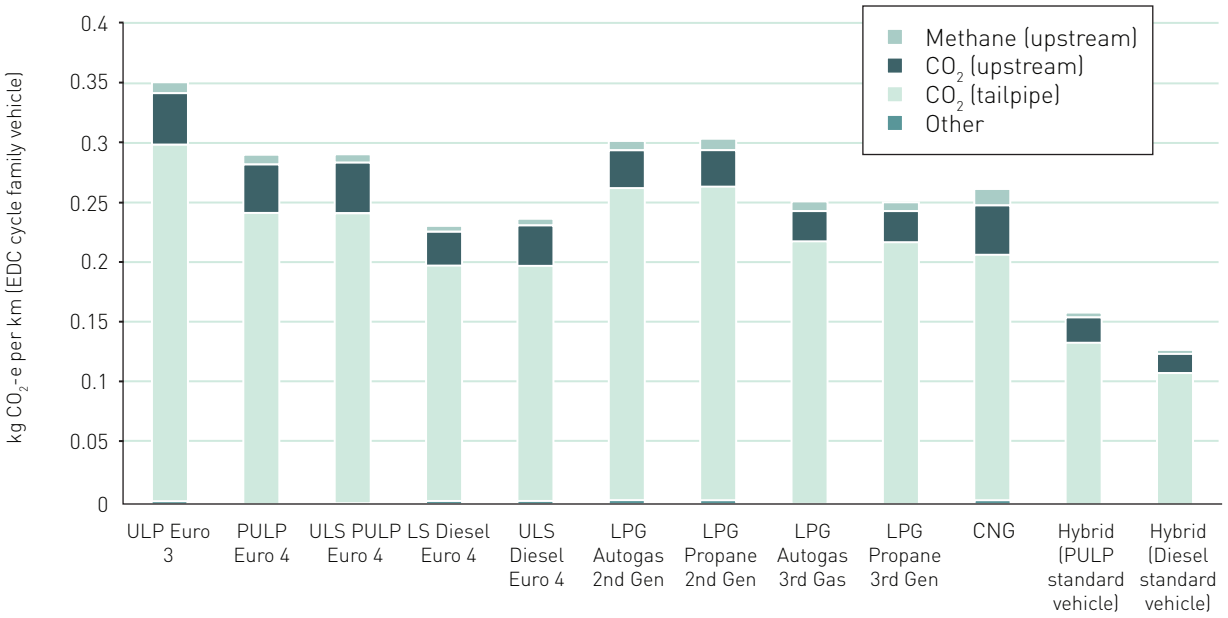
The physical characteristics and quality of motor vehicle fuel have implications for both fuel economy and greenhouse emissions. The *Fuel Quality Standards Act 2000* provides a legislative framework for setting national fuel quality and fuel quality information standards for Australia. The standards address fuel properties that are considered important in facilitating the adoption of emerging vehicle engine and emissions control technologies, and in managing ambient levels of pollutants identified as posing health and environmental problems. It is estimated that there may be reductions of up to 50 percent over 20 years for some pollutants as a result of these standards.[25] Fuel quality standards have been set for petrol, diesel, biodiesel and LPG autogas. Fuel quality standards are currently being considered for diesohol and ethanol. Notwithstanding this, Australia lags behind Europe in the introduction of more stringent standards.

The cleaner fuels grants scheme was established under the Fuel Quality Standards Act. It aims to reduce transport emissions and facilitate the uptake of new engine technologies by encouraging the manufacture and importation of fuels that have a reduced impact on the environment. Under the scheme, eligible firms can receive a grant of 38.143 cents per litre (discounted from the fuel excise) for producing certain fuels including biodiesel, renewable diesel, and low or ultra-low sulphur conventional fuels, such as low sulphur premium unleaded petrol and ultra-low sulphur diesel. From 1 July 2011, compressed natural gas, LPG, liquefied natural gas, ethanol, and methanol will be eligible for the grant.[26]

The Fuel Quality Standards Act sets the parameters for the amount of toxic pollutants, such as benzene and sulphur, that come from petrol emissions. Figure 8.1 shows that a significant difference in CO_2 emissions exists between the Euro 3 and Euro 4 standards. The first tranche of fuel standards commenced with the lowering of sulphur levels in unleaded petrol and lead replacement petrol to 500 parts per million (ppm) at the beginning of 2002 and concluded with a level of 50 ppm of sulphur in diesel at the beginning of 2006.[27] The proposed reduction of sulphur content in premium unleaded petrol to 10ppm under the cleaner fuels grants scheme was raised in several submissions to the Review. However, this is a matter outside the scope of this Review. Nonetheless, it is noted that new petrol-powered vehicles sold into the Australian market will need to meet the Australian Design Rules for Euro 4 compliance in 2010.

22 Westin F, *Squaring the Circle: Emissions Standards in the Car Industry*, Equity Research, December 2005, p. 4.
23 FCAI, *Submission to the 2008 Automotive Review*, p. 52.
24 Standards implemented by the Japanese Government in 2007 set carmakers the challenge of achieving a fuel efficiency performance, which by 2015 must be more than 20 percent better than in 2004. This translates into a CO_2 target of 138 grams per kilometre.
25 Department of the Environment, Water, Heritage and the Arts, December 2007, http://www.environment.gov.au/atmosphere/fuelquality/standards/petrol/index.html
26 Australian Taxation Office, June 2008, http://www.ato.gov.au/businesses/content.asp?doc=/content/00128216.htm&page=2&H2
27 Department of Resources, Energy and Tourism, September 2004, http://www.ret.gov.au/Industry/Petroleumpetroleumdevelopmentpetroleumexplorationpetroleumretailandpetroleumrefiningandfuels/Pages/RefiningandFuels.aspx

Figure 8.1. Greenhouse gas emissions from family-sized vehicles[28]



Source: Beer et al. (2004).

Ethanol is derived from renewable biological feedstocks, and is generally blended with petroleum in Australia. Ethanol has a lower energy content compared to petroleum. In Australia, E10 (90 percent petroleum blended with 10 percent ethanol) is the maximum permitted ethanol content in petrol[29], but there is no fuel standard for ethanol currently under consideration. A number of Australian government initiatives support the uptake of biofuels such as ethanol (and biodiesel), including the $37.6 million Biofuels Capital Grants Program to support new or expanded biofuel production capacity, Commonwealth fleet use of E10, and simplification of the ethanol label. There are also many international efforts to increase the use of biofuels, including E85 (15 percent petroleum and 85 percent ethanol) in the United States, E100 (100 percent ethanol) in Brazil and tax incentives for biofuels in Germany.

Autogas (liquefied petroleum gas, or LPG) is widely available in Australia at about 3,300 service stations across the country. LPG has lower greenhouse gas emissions per litre of fuel consumed than petrol, but also has a lower energy content. "Therefore equivalent vehicles [of a similar size and type] tend to consume more of LPG than petrol to travel a given distance."[30] However, there is evidence to suggest that the level of CO_2 emissions from LPG is lower than that of petrol.[31] Figure 8.1 suggests that the levels of CO_2 emissions for LPG (see bars 8 and 9 in the figure) are comparable to that of premium unleaded petrol (PULP—bar 2 in Figure 8.1). The figure also demonstrates the improvements in CO_2 emissions gained from later generations of LPG technology compared to those from earlier generations.

The Australian Alternative Fuels Registration Board contended in its submission to the Review that LPG contains 80 percent less toxins and 60 percent less carbon monoxide emissions compared to petrol. Autogas fuel standards are dictated by the Fuel Quality Standards Act and the Fuel Standard (Autogas) Determination 2003.

Diesel has a relatively high energy content and, where engines are specifically designed to operate on diesel, they tend to be far more fuel-efficient than petrol engines.[32] Figure 8.1 shows that the latest generation of diesel fuels (bars 4, 5 and 12 of Figure 8.1) actually emit less CO_2 than premium unleaded petrol (PULP—bar 2). Nonetheless, diesel emits the highest level

28 Beer, T, Grant, T, Watson, H, Olaru, D, *Life-Cycle Emissions Analysis of Fuels for Light Vehicles*, Report Ha93a-C837/1/F5.2e to the Australian Greenhouse Office, CSIRO, n.p., May 2004, p. 4., viewed at http://www.environment.gov.au/settlements/transport/publications/lightvehicles.html

29 Department of the Environment, Water, Heritage and the Arts, June 2007, http://www.environment.gov.au/atmosphere/fuelquality/standards/ethanol/labelling.html

30 Department of Climate Change, 2008, http://www.greenhouse.gov.au/fuelguide/environment.html

31 Department of Climate Change, *National Greenhouse Accounts (NGA) Factors*, DCC, Canberra, January 2008, p. 11.

32 Department of Climate Change, 2008, http://www.greenhouse.gov.au/fuelguide/environment.html

of particulate pollution.[33] Diesel fuel standards are determined by the Fuel Quality Standards Act, the Fuel Quality Standards Regulations 2001 and the Fuel Standard (Diesel) Determination 2001. Australian Design Rules for more stringent standards on diesel-powered vehicles will be introduced early in the next decade.

Biodiesels are diesel fuels derived from plant or animal matter rather than petroleum sources. The most common blends in use in Australia are 5 percent biodiesel (B5) and 20 percent biodiesel (B20). Figure 8.2 shows the full range of CO_2 emissions of biodiesel depending on the source. Generally, diesel from feedstocks such as canola, palm oil, tallow and cooking oil have substantial CO_2 benefits. The lack of tailpipe emissions—these are very low as CO_2 is sequestered during B100 production—more than makes up for the upstream emissions, with savings of up to 87 percent for use of cooking oil. The immense full-life-cycle greenhouse gas emissions from biodiesel obtained from the clearing of forests should also be noted, with CO_2 emissions 59 to 136 times greater than for other biodiesel feedstocks. Australia currently uses blended fuels that have small CO_2 savings over petrol. Biodiesel standards are governed by the Fuel Quality Standards Act, the Fuel Quality Standards Regulations and the Fuel Standard (Biodiesel) Determination 2003.

The introduction of the Green Car Innovation Fund could hasten the development of technologies and vehicles equipped to operate on many of these fuels, leading to improved emissions outcomes.

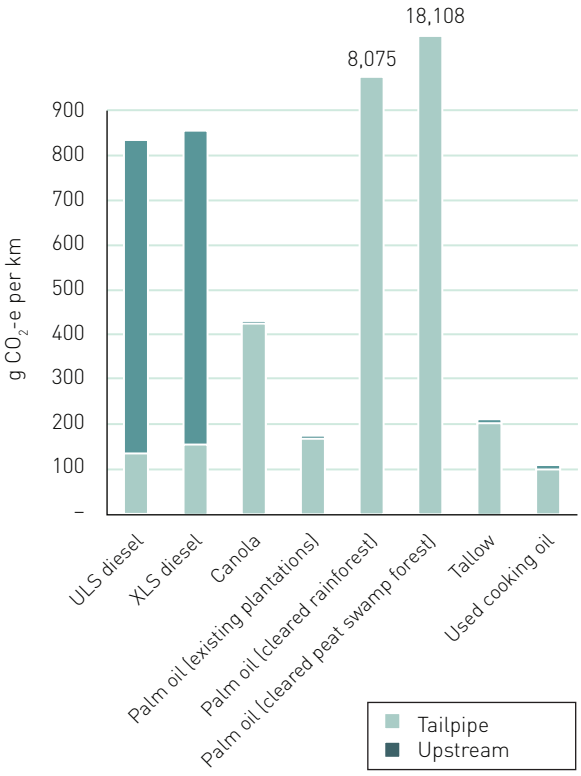
Fuel-efficient and low-emissions technologies—short term

The recent King Review, commissioned by the UK Government, examined the vehicle and fuel technologies that over the next 25 years could help to reduce carbon emissions of road transport, and particularly cars. The Review concluded that 30 percent fuel consumption savings are achievable for the average new vehicle in the short (5–10 year) time frame using existing technologies.

For example, "[r]ecent improvements in engine technology such as direct fuel injection have helped to achieve increased fuel economy and reductions in CO_2 without sacrificing performance, cost or convenience to consumers. Despite a 20 percent weight gain of

33 Beer, T, Grant, T, Watson, H, Olaru, D, *Life-Cycle Emissions Analysis of Fuels for Light Vehicles*, Report Ha93a-C837/1/F5.2e to the Australian Greenhouse Office, CSIRO, n.p., May 2004, p. 1.

Figure 8.2. Full-life-cycle greenhouse gas emissions from biodiesel (B100) and its various sources[34]



Source: Beer et al. (2007).

midsize vehicles in the past 20 years, a long-term trend of 0.6 percent fuel efficiency improvement per year has been observed, as a result of technical improvements".[35]

There is also a range of future technology options that could become increasingly important in the race for greater fuel efficiency, such as increasing use of lightweight materials, evolutionary improvements to current engines, and new powertrain technologies—the latter "including variable valve actuation, direct injection and turbo-charging, as well as 'mild' hybrid technologies such as stop-start and regenerative braking …".[36]

All the major vehicle manufacturers are moving to develop new fuel-efficient and low-emissions technologies, including the parent companies of local MVPs. In its submission, GM Holden stated that it is chasing "energy diversity on several fronts",[37] including:

34 Beer, T, Grant, T, Campbell, P, *Greenhouse and Air Quality Emissions of Biodiesel Blends in Australia*, Report Number KS54C/1/F2.29, CSIRO, 2007, p. 2.
35 King, J, *The King Review of low-carbon cars Part I: the potential for CO2 reduction*, HM Treasury, London, 2007, p. 43.
36 ibid., p. 44.
37 GM Holden, *Submission to the 2008 Automotive Review*, pp. 55–56.

- the continued improvement of the efficiency of internal combustion engines, both petrol and diesel;
- intensified efforts to displace traditional petroleum-based fuels with biofuels including ethanol and other alternative fuels;
- the development of sustainable production processes, such as cellulosic ethanol production, which uses carbon-based waste material as feedstock; and
- the development of electrically driven vehicles, such as hybrids, fuel-cells and extended-range electric vehicles.

Ford also claims to have directed many of its innovation activities to the development of green driving technologies. In its submission to the Review, Ford stated that a significant part of the company's annual R&D expenditures is invested in environmental initiatives, in particular the introduction of "CO_2 reducing technologies such as Eco Boost, which is a direct injection turbo charging technology". Reductions of CO_2 emissions of around 15 percent are claimed for this particular technology.[38]

Toyota Australia is due to assemble 10,000 hybrid Camrys a year from 2010. While this gives the Australian industry a stake in the hybrid sector, many MVPs are now turning to plug-in or fully electric vehicles as the wave of the future. Recent advances in lithium-ion technology have resulted in lighter batteries, which can power a vehicle for around 160 kilometres before they need recharging. This technology has progressed so rapidly in recent years that several major MVPs now consider plug-in electric cars to be commercially attractive. R&D teams attached to these MVPs are now fully engaged in ensuring that electric cars enter major markets such as the United States, Europe and Japan within the next few years.[39]

GM, for example, plans to launch its plug-in electric car, the Chevrolet Volt, by the end of 2010. The Volt will initially operate with a 'battery only' range of 64 kilometres, but GM plans to eventually increase the range to 1,000 kilometres by adding a small petrol or petrol/ethanol engine for recharging the lithium-ion battery.[40] Toyota and Mitsubishi also remain on target to sell their own electric cars in the United States in 2010. Like the Volt, the Toyota plug-in vehicle is expected to have an all-electric range of 64 kilometres.[41] In addition, Renault–Nissan plans to offer a broad range of plug-in electric cars in several major markets by 2012.

Renault–Nissan has formed a partnership with Project Better Place to offer electric vehicles to customers. In addition, the governments of Denmark and Israel will provide tax incentives to customers to promote the uptake of these vehicles. Renault–Nissan will supply the electric vehicles, and Project Better Place will construct and operate an electric recharge grid across the countries. Electric vehicles will be available for customers in 2011:

> *The Renault–Nissan Alliance / Project Better Place model will separate ownership of the car from the requirement to own a battery. Consumers will buy and own their car and subscribe to energy, including the use of the battery, on a basis of kilometers driven.*[42]

Future technologies

In the period up to 2030, it is expected that technological advances will follow a reasonably predictable pattern, with an increase in the use of hybrid technology and electric propulsion in motor vehicles. Beyond 2030, there is less certainty over which technologies will dominate low-emissions cars, "but almost complete decarbonisation will demand significant advances in technology".[43]

Hydrogen is a long-term technology that is being seriously considered by a range of MVPs. Hydrogen fuel cells combine hydrogen and oxygen to produce electric energy, with water as the only by-product. GM's long-term global strategy is to eventually replace all carbon-based fuels with hydrogen fuel-cell-powered vehicles. GM aims to have a valid hydrogen fuel-cell propulsion system by 2010 that is competitive with current internal-combustion systems in terms of durability, performance and cost.[44] In April 2007, BMW introduced its first 7-Series production hydrogen internal-combustion vehicles in both the United States and Germany.

Over the longer term, possibly by 2050, nearly complete decarbonisation of road transport may be a realistic goal. This will require advances in

38 Ford, *Submission to the 2008 Automotive Review*, pp. 37–38.
39 *Australian Financial Review*, 'Which Car?', 14 June 2008.
40 ibid. See also 'GM plans to vault ahead with electric car Chevrolet Volt', *International Business Times*, 22 November 2007.
41 King, J, *The King Review of Low-Carbon Cars. Part II: Recommendations for Action*, HM Treasury, London, 2008, p. 23.
42 Refer to http://www.greencarcongress.com/2008/01/renault-nissan.html
43 King, J, *The King Review of Low-Carbon Cars. Part II: Recommendations for Action*, HM Treasury, London, 2008, p. 23.
44 GM Holden, *Submission to the 2008 Automotive Review*, pp. 58–59.

hydrogen and/or electric battery technology as well as a 'zero-carbon' source for hydrogen production or battery charging. Reduction of CO_2 per kilometre by 90 percent (and total CO_2 emissions by 80 percent) may then be possible. Taking account of these predicted long-term scenarios—while allowing for immediate or short-term contingencies—is crucial to setting up the appropriate institutional R&D arrangements and research priorities for the Australian automotive industry.[45]

GREEN CAR INNOVATION FUND

As discussed in Chapter 4, the Australian Government has committed to introducing a $500 million Green Car Innovation Fund to encourage the Australian automotive industry to develop and manufacture low-emissions vehicles in Australia, with the Government investing one dollar for every three dollars invested by the industry. The broad objectives of the Fund are to assist in the reduction of automotive greenhouse gas emissions and enhance the long-term competitiveness and sustainability of the Australian automotive industry. The program, which would generate a total of $2 billion of investment in automotive innovation, has been well received by the automotive industry.

The Review was asked to make recommendations on the delivery of the Fund.

The draft report of the Garnaut Climate Change Review proposes that transport sector greenhouse gas emissions should be covered from the outset of an emissions trading scheme and notes that far-reaching innovation will be needed to achieve the deep cuts necessary to stabilise atmospheric greenhouse gas concentrations. It notes that there are externalities associated with private investment in commercialising new low-emissions technologies and that without government intervention there will be suboptimal levels of private investment. On 16 July, the Government released its Green Paper on the Carbon Pollution Reduction Scheme. This also proposed the inclusion of transport in an emissions trading scheme.

For the Australian automotive industry, a carefully targeted Fund would complement the introduction of an emissions trading scheme. The Australian automotive industry, with its innovative design and engineering base, is well positioned to respond to global demand for low-emissions, fuel-efficient cars in every vehicle class, including the large passenger cars produced in Australia.

There will also be strong opportunities for a wide range of niche low-emissions automotive technologies. The commercial benefits are likely to go to the early developers of these technologies, so it is important that the Australian industry moves quickly to exploit these opportunities. The Fund will therefore be important in re-structuring the industry to an economically and environmentally sustainable future.

In June 2008, the Prime Minister announced a grant from the Fund of $35 million to Toyota to assist it in establishing production of hybrid petrol–electric Toyota Camrys in Australia.[46] The Victorian Government will also make a contribution. In making the announcement, the Prime Minister noted the benefits to Australian motorists, the Australian motor vehicle industry, and the environment. He also stated that the Fund was to assist the start-up of new technologies and business, rather than a production subsidy.

To maximise the potential benefits of the Fund, the Government will need to consider a range of issues in designing its structure and eligibility criteria, including the organisations, technologies and activities that would be eligible to receive funding.

Structure of the Fund

Automotive industry investment decisions are made in the context of long product development cycles. The full benefits of initiatives supported by the Green Car Innovation Fund may not be evidenced for some years after the support is provided. The structure, eligibility criteria and application processes for the Fund should therefore be established as a matter of priority and its introduction brought forward to 2009. In addition, if the Fund proves successful in the first two years of operation, it should be extended beyond its initial five years.

Assistance under the Fund should be paid as cash grants, following a competitive selection process based on broad criteria to assess the innovation, technological, commercial and environmental merits of applications. The Minister for Innovation, Industry, Science and Research should have responsibility for approving individual grants, informed by recommendations from an independent board established for this purpose.

45 ibid.

46 Rudd, K (Prime Minister of Australia), *Toyota to Build Hybrid Camry in Australia*, media release, 10 June 2008, viewed at http://www.pm.gov.au/media/Release/2008/media_release_0295.cfm

Automotive investment is uneven and 'lumpy' over time, with some projects taking several years to reach commercialisation. It is also likely that the quality of applications may vary across time periods. For this reason, there should be some scope to vary the amount of Fund payments between years, rather than mandating $100 million for each of the five years.

The technological and commercial risk profiles of funding proposals may vary considerably. It may therefore be worth considering some scope for the Minister to adjust the one-to-three dollar funding ratio within a range (for example, one-to-two to one-to-four) to take account of this variation.

There are several ways this could be structured. One approach might be to categorise proposals as (i) incremental new-to-the-firm innovations (for example, the Toyota Camry hybrids project), (ii) radical new-to-the-world innovations, (iii) new-to-the-world R&D that is collaborative with public sector research organisations, and (iv) new-to-the-world R&D that is collaborative with overseas partners. A specific funding ratio could then be applied to each category according to its risk profile.

To ensure that funding is focused on projects that contribute to the Australian development and commercialisation of low-emissions automotive technologies, the Government might also consider specifying the broad allocation of funds between these categories of activities.

There may be a need to set a maximum limit on the amount of support available to any one Fund recipient. However, this limit should be set at a high level in order not to restrict significant developments that may have the potential to deliver substantial innovation, commercial and environmental returns.

Eligibility criteria

Mandatory and discretionary criteria should be designed to assess proposals against a mix of quantitative and qualitative aspects. Commercial application of technology should be a mandatory criterion to deter pure research proposals that would not provide assured commercial or environmental benefits.

Eligibility criteria for the Fund should not unduly restrict the scope of applicants to develop proposals that would deliver maximum benefits to Australian automotive innovation, industry and greenhouse gas abatement. The Review recommends that eligibility be open to all organisations, including research organisations, and individuals, while acknowledging that applications containing a clear path and commitment to Australian commercialisation and production would be most likely to fulfil the Government's objectives for the Fund. Foreign investors should be encouraged to apply for funding where the proposal has commercial application in the Australian automotive supply chain.

Similarly, Fund eligibility should not be restricted to any particular range of automotive technologies. Green automotive innovation and commercialisation may emerge from a range of automotive technologies. Assessment of applications will need to carefully consider and compare the commercial, technological and environmental merits of applications. The eligibility criteria should not unduly favour automotive powertrain technology, but be open to all 'green' automotive components, systems, technologies and processes. Given Australia's international position as a producer of niche automotive products, it should not be assumed the Fund would only support Australian production of complete 'green' cars.

The Fund should have clawback provisions so that firms cannot claim for the same activity from multiple funding sources.

FRINGE BENEFITS TAX

There is anecdotal evidence that current FBT arrangements encourage drivers to increase the amount of kilometres driven in order to reduce FBT liability. This is at odds with the Government's broad environmental goals of reducing carbon emissions.

A recent survey undertaken by fleet management company SG Fleet found that, of 15,496 novated leases under its management in the FBT year ending 30 March 2008, a disproportionate number of drivers travelled between 15,000 and 16,000 kilometres or between 25,000 and 26,000 kilometres, as shown in Figure 8.3.[47]

Both of these brackets fall on a significant FBT statutory percentage reduction, as shown in Table 8.2.

Table 8.2. FBT statutory percentages[48]

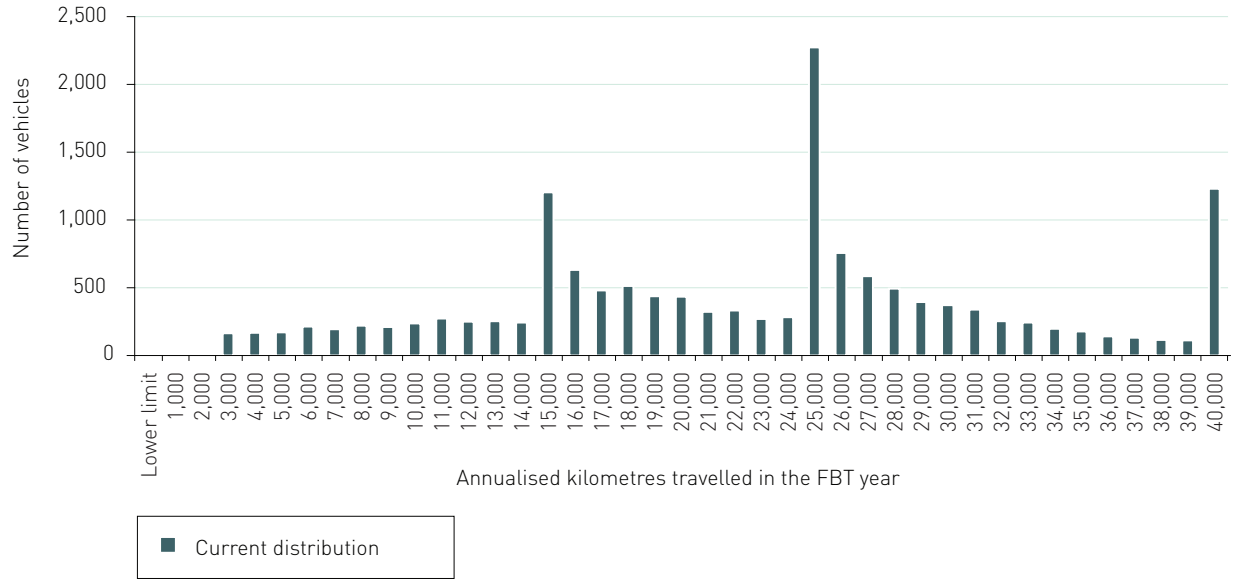
Total kilometres travelled during the year	Statutory percentage
Less than 15,000	26%
15,000 to 24,999	20%
25,000 to 40,000	11%
Over 40,000	7%

Source: Australian Taxation Office.

47 SG Fleet had 65,000 vehicles in total under management, as at March 2008.

48 Australian Taxation Office, *Fringe Benefits Tax (FBT) Rates and Thresholds*, May 2008, http://www.ato.gov.au/businesses/content.asp?doc=/Content/76140.htm&page=4&H4

Figure 8.3. SG Fleet: number of vehicles and kilometres travelled in the FBT year ending March 2008[49]



Source: SG Fleet.

These data are consistent with the supposition that drivers aim for particular kilometre bands in order to reduce their FBT liability. For example, SG Fleet estimates that the cost of driving an extra 2,000 to 3,000 kilometres to fall within a lower FBT bracket would be easily offset by the gain of moving from the 20 percent to the 11 percent bracket. In doing so, drivers are travelling more kilometres and emitting more CO_2-equivalent emissions than they otherwise might.

SG Fleet proposes a short- and a long-term policy change. In the short term, the policy is to more evenly spread the FBT/kilometres band so as to encourage drivers to only use their vehicles as often or as little as they need to. The new statutory rate proposed by SG Fleet (see Table 8.3) would have the effect of eliminating the large financial incentives currently available to drivers who plan their vehicle usage to reach a certain FBT bracket. It does this by requiring drivers who use their vehicles less to pay a little bit more FBT, which is offset to a large extent by the reduction in running costs. The flipside means that the financial incentive to travel extra kilometres can be offset by the running costs involved in travelling the extra kilometres.

Table 8.3. SG Fleet's proposed statutory fractions[50]

Number of kilometres travelled per FBT year	Statutory fraction
0–14,000	26%
14,001–16,000	21%
16,001–18,000	19%
18,001–20,000	17%
20,001–22,000	15%
22,001–24,000	13%
24,001–26,000	11%
26,001–34,000	10%
34,001–40,000	9%
40,001+	7%

Source: SG Fleet.

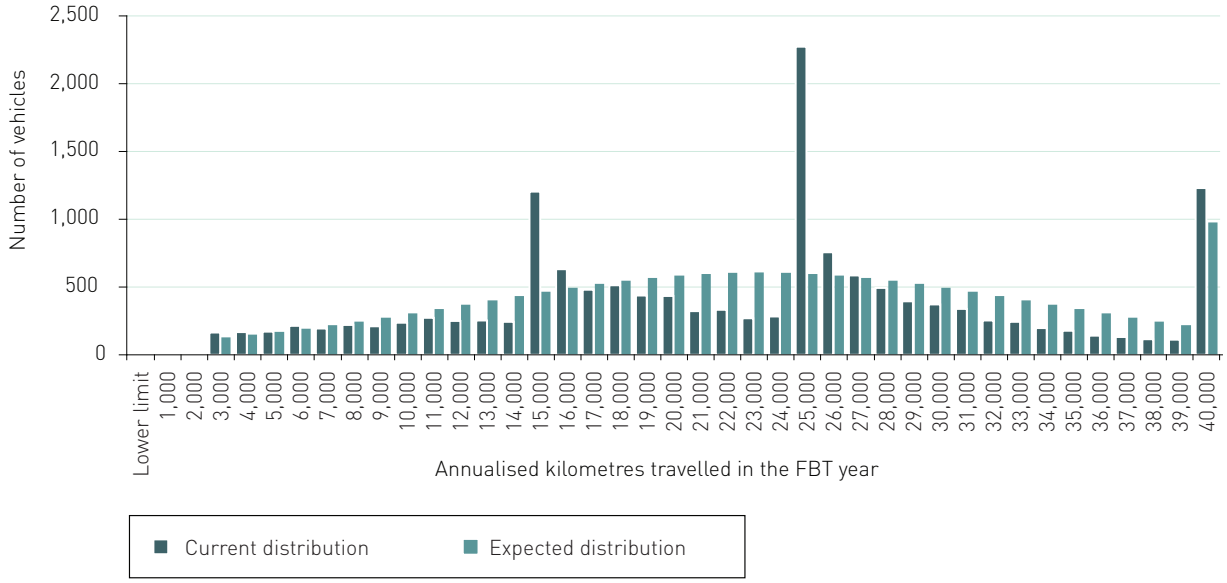
The implementation of a flat structure, regardless of distance travelled, was also suggested in some submissions. However, a flat structure would set an arbitrary amount and could lead to results contrary to intended FBT policy outcomes. A rate that is too low could reduce the cost of salary packaging vehicles, and thus erode the effectiveness of the FBT system. On the other hand, a high rate could remove the incentive to salary package vehicles altogether.

The staggered decrease in the statutory fraction, as seen in Table 8.3, is more appropriate, as it achieves the policy objective outcomes of the FBT without

49 SG Fleet, *Submission to the 2008 Automotive Review*, p. 3.

50 SG Fleet, *Submission to the 2008 Automotive Review*, p. 3.

Figure 8.4. Current and expected distribution of kilometres travelled



Source: SG Fleet.

encouraging the over-use of vehicles that is prevalent under the current system. SG Fleet believes that this measure would be revenue neutral and lead to a more even distribution in kilometres travelled, as shown in Figure 8.4.

LPG VEHICLE SCHEME

The Australian Government's LPG Vehicle Scheme encourages the uptake and use of LPG as a cheaper alternative fuel. Under the scheme, $2,000 will be paid following the LPG conversion of a new or used petrol or diesel motor vehicle, and a grant of $1,000 will be paid following the purchase of a new motor vehicle with an LPG unit fitted at the time of manufacture of the vehicle. As of 15 June 2008, a total of 136,838 grants had been paid to a total value of $272.6 million.[51]

A majority of grants under the scheme (99.2 percent) were paid for LPG conversions. However, several submissions noted that the technology used for such conversions is behind the technology that can be installed at the time of vehicle manufacture. According to LPG Australia, there are technologies currently available (such as LPG injection) that demonstrate significantly better performance and lower greenhouse gas emissions compared to other retrofitted LPG technologies. These technologies also comply with Euro 2, Euro 3 and Euro 4 emission standards.[52]

However, LPG injection technology is only installed in about 10 percent of the Australian LPG fleet. In its submission, Orbital noted that the LPG passenger car market is "served by generally unsophisticated aftermarket LPG systems which have been developed in Europe and are fitted by local garages as an aftermarket fitment. In most cases the systems being utilised do not meet the demands of the average consumer in terms of performance, driveability and range".[53] On the other hand, in response to a request for details on the improvements in CO_2 performance gained in the conversion of older vehicles from unleaded petrol (ULP) to LPG using a standard fumigation system, LPG Australia undertook an evaluation of the emissions performance as between ULP and LPG. These results show improved emissions outcomes from converting ULP vehicles to LPG using a standard fumigation system. The results are presented at Appendix G.

The benefits of LPG for the Australian vehicle industry are also limited by LPG's narrow application in local vehicle manufacturing. Ford Australia is currently

51 AusIndustry, *LPG Vehicle Scheme Statistics*, DIISR, Canberra, July 2008, viewed at http://www.ausindustry.gov.au/content/content.cfm?ObjectID=A622D054-FBD0-48A2-A70D56E6002630CD&L2Parent=&L3Parent=D47685C8-0B0B-459C-B07A2EFBDB3D4AF7

52 LPG Australia, *Submission to the 2008 Automotive Review*, p. 7.

53 Orbital Australia, *Submission to the 2008 Automotive Review*, p. 4.

the only locally based MVP to produce a vehicle that runs on dedicated LPG. This system has yet to be developed further as part of the FG Falcon program and could be retired when the company shifts to a global V6 engine in 2010.[54] However, in May 2008, GM Holden announced that it was considering manufacture of a dedicated-LPG version of the Commodore.[55]

The LPG Vehicle Scheme should encourage the uptake of the best available technologies, which can be better achieved by an increase in the grant for new factory-fitted LPG technologies. Lowering the price of such vehicles would increase demand for them, leading to improved GHG emission outcomes. Figure 8.1 demonstrates the greenhouse gas reductions that can be found from implementing newer generations of LPG technology. An increase in the grant would also have the benefit of encouraging the purchase of newer vehicles with improved fuel efficiency.

The development of such LPG technologies in Australia is important, as the overall investment requirements for this LPG system development process are lower than a 'clean sheet technology' and it can also be implemented in the short to medium term as the LPG refuelling infrastructure is already in place.[56] In addition, Australia has abundant reserves of natural gas for both LPG and compressed natural gas.

Initiatives to improve greenhouse gas emissions from vehicles through the revised LPG Vehicle Scheme complement the inclusion of road transport in an emissions trading scheme—one policy encourages Australian MVPs and consumers to adopt technologies and improve emissions outcomes while the other penalises those who use less fuel-efficient vehicles, which have higher greenhouse gas emissions.

FLEET PURCHASING POLICIES

As discussed earlier, government fleet sales are an important part of total Australian-made vehicle sales. Less than 25 percent of Australian-made vehicle sales in 2007 were to private buyers. In the same year, governments across various levels purchased 37,073 (or 18.5 percent) Australian-made vehicles. For this reason, the shift in government purchasing policies toward more fuel-efficient vehicles presents a major challenge to the Australian automotive industry, which produces predominately large vehicles. Appendix H summarises the various Australian, state and territory government fleet procurement policies.

The Australian Government has announced a purchasing framework that has, among a range of considerations, the 'environmental benefit' of a vehicle. The Government also aims to increase the proportion of its fleet with Green Vehicle Guide (GVG) scores of 10.5 or greater from 18 percent to 28 percent. The Government has recently implemented a policy of encouraging users of Commonwealth vehicles to purchase E10 where possible. Since the commencement of the policy, the government fleet's monthly consumption of E10 has increased from 2,000 litres during October 2005 to 150,000 litres during June 2007.[57]

All Australian states and territories have announced measures to reduce emissions from their government fleets. Queensland has made the most substantial changes to its fleet purchasing policy in response to environmental concerns. The Queensland Government aims to reduce annual emissions by 15 percent by the end of 2010, 25 percent by the end of 2012, and 50 percent by the end of 2017. More importantly, the fleet is to have a minimum 5.5 greenhouse rating under the GVG, which would exclude the Holden Commodore from any government purchase. However, all other Australian-made vehicles (except the Ford Territory) have GVG greenhouse ratings of 5.5 or greater.

Victoria and Western Australia have made commitments to LPG vehicles, with the latter aiming for 25 percent of its six-cylinder vehicles to run on LPG. Victoria, Western Australia, the Australian Capital Territory and South Australia have, or will have, a fleet that includes some hybrid vehicles. The Australian Government has also announced that it will include the Toyota Camry hybrid in its purchasing arrangements when this vehicle is produced in Australia.

These fleet preference policies should continue to encourage the development of the local industry while also aiming to improve greenhouse gas emissions outcomes. As noted, the local industry is embarking on a range of measures to improve environmental outcomes. The inclusion of road transport in an emissions trading scheme may overcome the need for governments to mandate fleet purchase preferences on carbon dioxide per kilometre targets.

54 ibid.
55 Trounson, A, 'Car trade too small for green switch', *The Australian*, 13 June 2008.
56 Orbital Australia, *Submission to the 2008 Automotive Review*, p. 6.
57 Department of Finance and Administration, *Annual Report 2006/07*, DoFA, Canberra, 2007, p. 91.

SUMMARY OF FINDINGS

- In 2006, road transport accounted for 68.9 million tonnes (or 12 percent) of Australia's net greenhouse gas emissions. Passenger cars were the largest source of these emissions, contributing 42.6 million tonnes. This was 7.4 million tonnes (or 21 percent) higher than in 1990.
- An economy-wide emissions trading scheme (which includes road transport) is an efficient mechanism to determine least-cost emissions abatement.
- The introduction of an emissions trading scheme in Australia could lead to a situation where Australia could export its greenhouse gases from vehicle and component manufacture through the purchase of automotive goods from economies without an emissions trading scheme.
- Additional vehicle emissions targets for vehicles would be overly burdensome if an economy-wide emissions trading scheme is in place.
- Alternative fuels have the capacity to significantly reduce greenhouse gas emissions. However, this is dependent upon the sources of the fuels.
- The local industry is embarking on a range of initiatives to reduce greenhouse gas emissions outcomes.
- Initiatives to improve greenhouse gas emissions from vehicles through a revised LPG Vehicle Scheme complement the introduction of an economy-wide emissions trading scheme that includes road transport—one policy encourages Australian motor vehicle producers and consumers to adopt technologies and improve emissions outcomes while the other penalises those who use less fuel-efficient vehicles that have higher greenhouse gas emissions.

RECOMMENDATIONS

- Road transport (including fuel) should be included in the emissions trading scheme as it allows the industry to determine the lowest-cost form of emissions abatement. In this respect, future consideration of mandatory emissions targets for new vehicles should have regard to development of the emissions trading scheme.
- If the emissions trading scheme excludes road transport, then a mandatory greenhouse gas emissions target should be introduced as a 'second best' policy.
- The Henry Review of taxation should consider the adoption of a new fringe benefits tax statutory rate table that is more evenly spread across the range of kilometres travelled. The new rate table would encourage drivers to use their vehicles only as necessary.
- The grant for liquefied petroleum gas (LPG) units fitted at the time of manufacture of a vehicle under the LPG Vehicle Scheme should be raised from $1,000 to $2,000, provided it facilitates the uptake of new technologies that provide significantly better greenhouse gas emissions outcomes than currently fitted LPG technologies.
- Australian governments should continue to include Australian-made vehicles as a major part of their purchasing policies, and should reinforce this through a threshold agreement at the Council of Australian Governments. This should be subject to the local industry continuing to improve greenhouse gas emissions outcomes through the uptake of various emissions abatement technologies.

Green Car Innovation Fund

- The Green Car Innovation Fund should assist the Australian automotive industry with developing and commercialising technologies aimed at improving vehicle fuel efficiency and emissions. The combination of the Fund with an emissions trading scheme will drive positive innovation and environmental outcomes for the economy and the industry.
- In preparation for an emissions trading scheme, the start date of the Fund should be brought forward to 2009.
- If the Fund proves successful in its first two years of operation, its funding should be doubled from $500 million to $1 billion and the scheme extended beyond its initial five years.
- Benefits from the Fund should be paid as cash grants, following a competitive selection process based on broad criteria that assess the innovation, technological, commercial and environmental merits of applications.
- Since automotive industry investment is often 'lumpy' there should be scope under the Fund to vary the amount of Fund payments between years.
- There should be scope to vary the one-to-three dollar funding ratio within a range (for example, one-to-two dollars to one-to-four dollars) to take account of varying risk profiles.

- There should be a maximum limit set on the amount of support available to any one funding recipient. This limit should be set at a high level in order not to restrict significant projects.
- Mandatory and discretionary criteria should be designed to assess proposals against a mix of quantitative and qualitative aspects. Commercial application of technology should be a mandatory criterion.
- All organisations and individuals should be eligible, including participants in the automotive supply chain, research organisations, and international firms where eligible activities are performed in Australia.
- Fund eligibility should not be restricted to any particular range of automotive technologies.

CHAPTER 9:
RESTRUCTURING THE AUSTRALIAN AUTOMOTIVE INDUSTRY

INTRODUCTION

The automotive industry is a major employer in Australia. However, the industry is facing international and domestic competitive pressures that will continue to shape its size, structure and workplace practices.

Cost pressures in manufacturing generally are driving an international trend towards moving production to lower labour cost centres such as Asia. Indeed, lower overseas labour costs have been cited in one study as the factor that has the greatest effect on the competitiveness of the Victorian automotive components industry.[1] GM Holden's submission noted that, with the current strength of the Australian dollar, its global parent considers Australia to be a high-cost country for manufacturing—in the highest third of benchmarked locations.[2] At the same time, a strong labour market in Australia has placed upward pressure on domestic costs across a range of in-demand skill categories.

EMPLOYMENT

Current employment

In the May 2008 quarter, the Australian automotive sector employed a total of 64,800 people and comprised 5.8 percent of Australia's manufacturing employment.[3,4] About 93 percent of the automotive jobs were full-time, compared to 72 percent for all industries.[5]

Over the longer term, total employment in the sector has fallen by 25.3 percent since the peak of 86,800 people in November 2002, but risen by 17.3 percent since a long-term low of 55,200 people in August 1999 (see Figure 9.1).[6]

Within the automotive industry, motor vehicle manufacturing was the main employer (accounting for 40 percent of employment). It was followed by automotive component manufacturing (32 percent); motor vehicle body manufacturing (23 percent); and automotive electrical and instrument manufacturing (5 percent).[7]

The automotive industry is regionally concentrated. In 2006, Victoria and South Australia together accounted for almost three-quarters of national automotive industry employment. In particular, 10 statistical regions in and around Melbourne and Adelaide comprised almost half of the national total (see Tables 9.1 and 9.2).

1 Australian Industry Group, Federation of Automotive Products Manufacturers, The Victorian Components Industry, Competitiveness, Profitability, and Future Strategies, AIG, Sydney, 2005, p. 17, viewed at http://www.aigroup.asn.au/aigroup/pdf/economics/surveys_and_reports/2838_VicAutoReport_KPMGv2.pdf

2 GM Holden, *Submission to the 2008 Automotive Review*, pp. 18, 80.

3 Australian Bureau of Statistics, *Motor Vehicle and Parts Manufacturing*, cat. no. 6291.0.55.003, ABS, Canberra, May 2008.

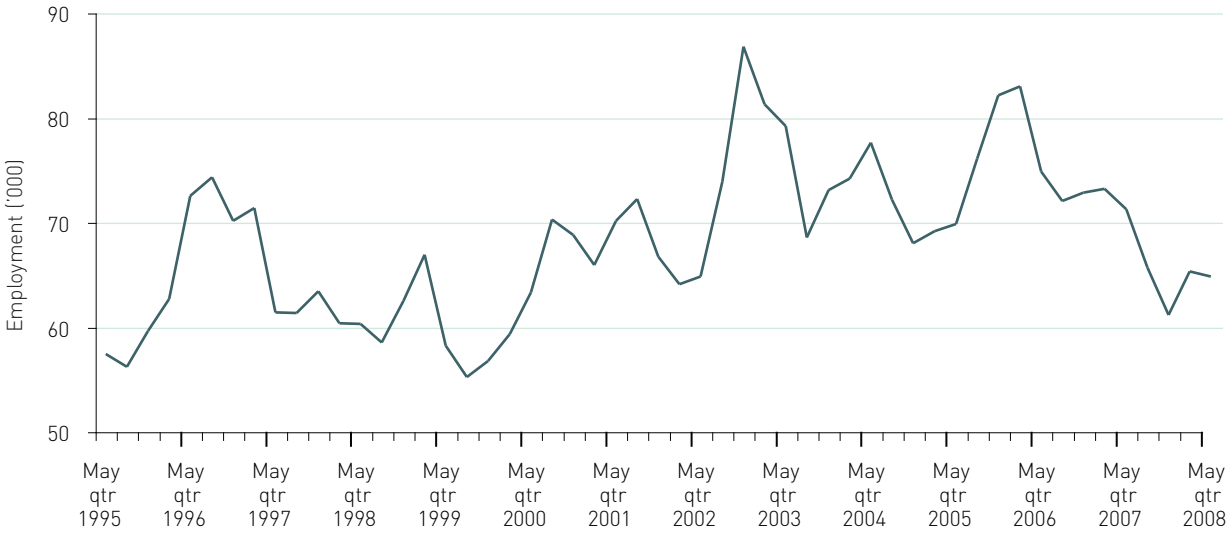
4 It is worthwhile noting that there can be significant volatility in the employment data. For example, the May 2008 data indicates employment was up by 6 percent (from 61,100) since the November 2007 quarter.

5 DEEWR, *Submission to the 2008 Automotive Review*, p. 7.

6 Australian Bureau of Statistics, *Motor Vehicle and Parts Manufacturing*, op. cit.

7 Australian Bureau of Statistics, *Manufacturing Industry, Australia, 2005–06*, cat no. 8221.0, ABS, Canberra, 2007.

Figure 9.1. Total employment in motor vehicle and parts manufacturing, May 1995 to May 2008



Source: Australian Bureau of Statistics.

Table 9.1. Automotive industry employment in Australia, by state and territory, 2006

State or territory	No. of persons employed	Proportion of national auto employment (%)
Victoria	33,888	55.3
South Australia	11,145	18.2
New South Wales	6,793	11.1
Queensland	6,748	11.0
Western Australia	2,228	3.6
Northern Territory	110	0.2
Australian Capital Territory	54	0.1
Other territories	0	0.0

Source: Australian Bureau of Statistics.

Table 9.2. Automotive employment, selected Victorian and South Australian statistical subdivisions, 2006

Statistical subdivision	No. of persons employed	Proportion of national auto employment (%)
Northern Adelaide	5,333	8.7
Western Melbourne	4,386	7.2
South Eastern Outer Melbourne	3,391	5.5
Southern Adelaide	2,981	4.9
Melton–Wyndham	2,227	3.6
Greater Geelong City Part A	2,208	3.6
Eastern Middle Melbourne	2,125	3.5
Hume City	2,115	3.4
Southern Melbourne	2,083	3.4
Greater Dandenong City	2,052	3.3
Subdivisions total	28,901	47.1

Source: Australian Bureau of Statistics.

The Victorian Government estimates that a further 100,000 jobs directly or indirectly depend on automotive manufacturing, in industries such as steel, glass, plastics and services.[8] The Federation of Automotive Products Manufacturers notes that the automotive industry generates 6.5 jobs in associated supply and consumer industries for every one automotive job.[9]

Employment outlook

Some announced closures are not yet reflected in the available automotive industry employment data. For example, South Pacific Tyres will close its tyre factory in Somerton, Victoria, from December 2008, and GM Holden and Ford have announced engine plant closures to take effect from 2009 and 2010 respectively. In combination, these three closures will directly affect more than 1,700 employees.[10,11,12] On the other hand, Ford announced in 2007 that local production of the Ford Focus from 2011 will create about 300 new jobs.[13]

The Department of Education, Employment and Workplace Relations forecasts that automotive employment "may well continue to weaken over the course of 2008". Over the five years to 2012–13, employment "is expected to decrease at an average rate of 1.5 percent per annum" (about 4,600 jobs in total).[14]

The Productivity Commission's modelling has projected that employment in automotive assembly would reduce in the long term by between 2.0 and 5.5 percent, and automotive component sector employment by between 0.2 and 1.8 percent, depending upon the specific future assistance arrangements modelled. If labour and capital productivity were to improve by 1.0 percent, then employment could reduce further by about 0.5 percentage points.[15]

In contrast, forecast employment across all industries is predicted to increase by an average of 1.5 percent per annum to 2012–13.[16] Consequently, automotive industry employment is expected to decline during a time of moderate growth across Australian industry.

> *Over the longer term, the outlook for employment in the Motor Vehicle and Parts Manufacturing sector will be largely determined by changes in the exchange rate, productivity growth (as Australian car manufacturers adjust to increasing competitive pressures from countries such as China and India) and the strength of domestic and global demand for locally produced vehicles and parts.*[17]

Job and re-employment prospects

Of the top 10 occupations (representing 56.4 percent of employees) in the automotive industry, six (29.4 percent) have average to good job prospects and four (27.0 percent) have below-average prospects. The regions identified in Table 9.2 generally "have unemployment rates either above or around the national average ... rate of 4.1 percent".[18]

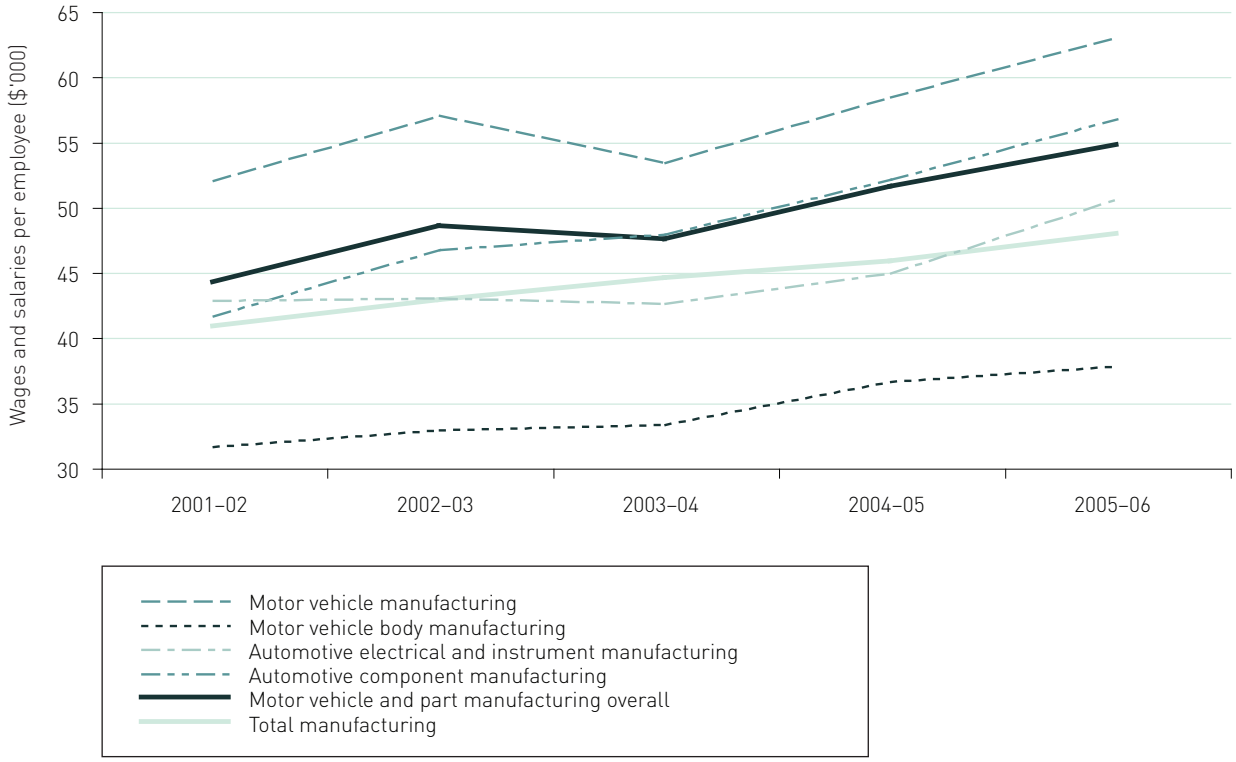
The combined effects of high regional concentration, generally higher unemployment rates in these regions, and variability in the demand for automotive skills could lead to automotive workers made redundant through closures and down-sizing having more difficulty finding work, despite an otherwise buoyant national labour market.

WAGES AND SALARIES

Gross wages and salaries[19] in the automotive industry rose by 24 percent (from about $44,000 to $55,000) in the five years to 2005–06. The corresponding increase for manufacturing was 17 percent (from $41,000 to $48,000). In 2006, wages and salaries in the automotive industry were 14 percent higher than in manufacturing in general (see Figure 9.2).[20]

8 Victorian Government, *Submission to the 2008 Automotive Review*, p. 7.
9 FAPM, *Submission to the 2008 Automotive Review*, p. 7.
10 Norington, B and Hannon, E, '600 jobs to go as Ford shuts plant', *The Australian*, 18 July 2007.
11 South Pacific Tyres, *South Pacific Tyres announces closure of Somerton factory. 587 jobs affected*, media statement, 26 June 2008.
12 GM Holden, *Holden Announces Timeframe for End of Family II Engine Production*, media release, 6 June 2008.
13 Ford, *Ford to Manufacture Small Cars in Australia*, media release, 23 July 2007, viewed at http://www.ford.com.au/servlet/ContentServer?pagename=FOA/DFYArticle/Standalone1024&cid=1178823150118&c=DFYArticle&pid=1137384212428&qid=1178823149932
14 DEEWR *Submission to the 2008 Automotive Review*, p. 14.
15 Productivity Commission, *Modelling Economy-wide Effects of Future Automotive Assistance, Research Report*, PC, Canberra, 2008, pp. 53, 62, 75.
16 DEEWR, *Submission to the 2008 Automotive Review*, p. 14.
17 ibid., p. 15.
18 ibid., pp. 12, 15.
19 The ABS defines gross wages and salaries as including: capitalised wages and salaries; termination and redundancy payments; salaries and fees of directors and executives; retainers and commissions of persons who received a retainer; bonuses; and, annual and other types of leave. Provision expenses for employee entitlements (eg provisions for annual leave and leave bonus, long service leave, sick leave, and severance, termination and redundancy payments) are also included. Refer to http://www.abs.gov.au/AUSSTATS/abs@.nsf/Latestproducts/8221.0Glossary12005-06?opendocument&tabname=Notes&prodno=8221.0&issue=2005-06&num=&view=
20 Australian Bureau of Statistics, *Manufacturing Industry, Australia, 2005–06*, cat no. 8221.0, ABS, Canberra, 2007.

Figure 9.2. Wages and salaries in the automotive industry and manufacturing, 2001–02 to 2005–06



Source: Australian Bureau of Statistics.

Although wages and salaries were higher overall in the automotive industry, there was significant variation within the industry itself. For example, wages and salaries were:

- highest amongst motor vehicle manufacturing employees ($63,000 in 2006), and 32 percent higher than the average for manufacturing generally;
- similar amongst automotive component manufacturing employees ($56,700) to the automotive industry average ($54,700); and
- lowest amongst motor vehicle body manufacturing employees ($38,000), or 31 percent lower than the broader automotive industry and 21 percent lower than manufacturing.

Table 1.2 provides a comparison of hourly workers compensation costs in Australia and other selected countries.

LABOUR PRODUCTIVITY

Australian automotive sector productivity

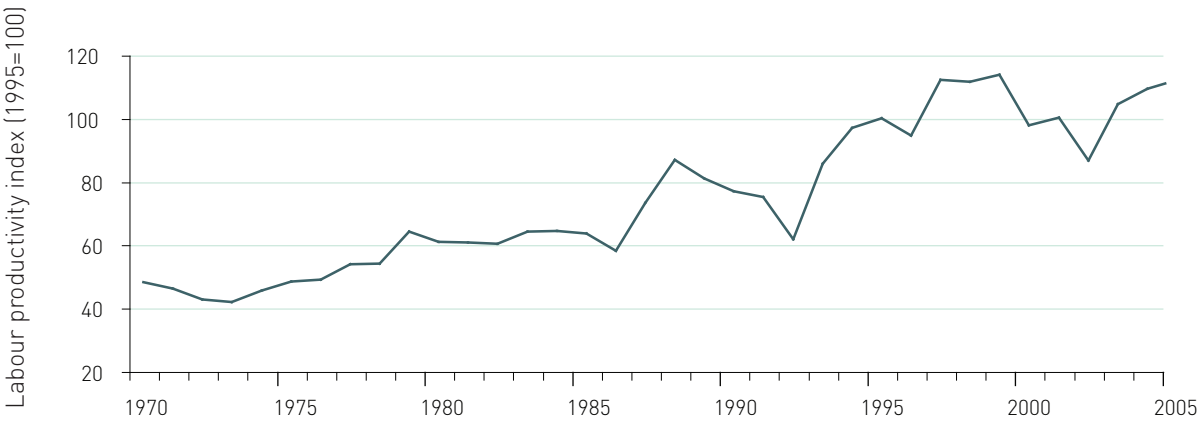
Labour productivity in the automotive industry grew by an annual average of 2.4 percent between 1970 and 2005 (see Figure 9.3).[21] This reflects annual average growth of 2.4 percent if labour productivity is measured by the number of vehicles per employee—the productivity series used by Australian Automotive Intelligence[22] and the Department of Innovation, Industry, Science and Research (and reported in 'Key Automotive Statistics'—see Appendix J).

The downturn in labour productivity in certain years is a result of model changeovers and industry rationalisation. For example, the large increase in productivity from the early 1990s could be attributable to several factors, including the closure by Ford of its Homebush plant and the transfer of production of the Camry and Corolla by Toyota from the Dandenong and Port Melbourne plants to Altona. There was also a corresponding decrease in employment as

21 EU KLEMS database, *Growth and Productivity Accounts: March 2008 Release*, Volume LP_I, gross value added per hour worked, vehicles, trailers and semi-trailers, http://www.euklems.net/euk08i.shtml#top

22 Australian Automotive Intelligence, *Australian Automotive Intelligence Yearbook 2008*, 7th edn., Richard Johns, 2008.

Figure 9.3. Labour productivity index in Australia, 1970–2005



Source: EU KLEMS database.

part of these rationalisations. Nissan ceased its manufacturing operations in 1992.

Productivity comparisons with other Australian sectors

Since 1970, annual average labour productivity growth in the Australian automotive industry (2.4 percent) has been the same as that for total manufacturing and above that for total industries (1.7 percent). Nonetheless, there was a sharp rise in automotive productivity growth (to 6.2 percent) during the period 1986 to 1995, followed by a marked slowing (to 1.9 percent) in the period 1996 to 2005. In the corresponding periods, manufacturing slowed (to 1.5 percent) then recovered (to 2.5 percent), while total industries remained constant—see Table 9.3.[23]

Table 9.3. Comparison of average annual labour productivity growth in Australian industries

Industry sector	Average annual growth		
	1970–2005 (%)	1986–1995 (%)	1996–2005 (%)
Motor vehicles, trailers and semi-trailers	2.4	6.2	1.9
Total manufacturing	2.4	1.5	2.5
Total industries	1.7	1.7	1.7

Source: EU KLEMS database.

Productivity comparisons with other countries

Long-term productivity growth in Australia's automotive industry has generally been slower than that in most other selected countries. In the most recent decade for which data are available (1996 to 2005), Australia's growth rate slowed to rank seventh out of eight countries sampled—see Table 9.4.[24]

Table 9.4. Comparison of automotive industry average annual labour productivity growth in selected countries

Country	Average annual growth			Ranking 1996–2005
	1970–2005 (%)	1986–1995 (%)	1996–2005 (%)	
Australia	2.4	6.2	1.9	7
France	4.5	3.4	6.8	3
Germany	2.7	2.2	3.4	4
Italy	1.4	0.8	0.4	8
Japan	NA	3.4	3.2	5
Sweden	4.8	5.1	9.0	2
UK	3.1	5.7	2.2	6
US	2.9	2.1	9.5	1

Source: EU KLEMS database.

23 EU KLEMS database, *Growth and Productivity Accounts*, Volume LP_I, EU KLEMS, March 2008, viewed at http://www.euklems.net/euk08i.shtml#top. Gross value added per hour worked, vehicles, trailers and semi-trailers.

24 EU KLEMS database, *Growth and Productivity Accounts*, Volume LP_I, EU KLEMS, March 2008, viewed at http://www.euklems.net/euk08i.shtml#top. Gross value added per hour worked, vehicles, trailers and semi-trailers. Note that KLEMS data is available only for a limited number of non-European countries.

Since 1996, Australia's average automotive productivity growth has been comparable with that of the United Kingdom; about 60 percent of Japan's; and about 20 percent of that of the United States and Sweden. The median productivity increase among the eight countries sampled was 3.3 percent over the same period, compared to Australia's 1.9 percent.

GM Holden's submission to the Review noted that productivity improvements have largely offset wage increases, but that "improvements have not been sufficient to counteract the impact of currency movements".[25] It is reasonable to assume that productivity increases cannot compensate for movements in exchange rates. Nonetheless, in order to remain internationally competitive, the Australian automotive industry's rate of productivity growth will need to increase substantially just to keep pace with that of its overseas competitors. The appreciation of the Australian dollar significantly compounds the competitiveness challenge.

SKILLS IN THE AUTOMOTIVE INDUSTRY

Skills shortages

Competitive pressures, combined with the introduction of new technologies and production processes, require the renewal and upgrading of workforce skills through a process of continuous improvement.

With unemployment in Australia at a long-term low, there is competition for skilled workers. In the manufacturing sector, 47 percent of employers are having some or great difficulty in recruiting staff, but 89 percent of manufacturing employers consider staff skill levels are adequate to or exceed their organisational needs.[26] Nonetheless, "there are indications in some States that a recent decline in manufacturing activity may have led to a slight easing of demand for metal trades, as retrenchments increase the supply of skilled workers available to other employers".[27]

The following skills categories are of significance to the automotive industry and are currently experiencing national or statewide shortages: managing and mechanical engineers; accountants; fitters; metal fabricators; toolmakers; welders; motor mechanics; vehicle painters; vehicle body makers; and general electricians. Many of these categories are on the National Skills Needs List used by the Department of Education, Employment and Workplace Relations to assess the eligibility of employers and apprentices for a range of incentives and initiatives that encourage apprentices to take up the occupations. Some professions and trades of relevance to the automotive industry are also on the Migration Occupations in Demand List used in targeting migrants with in-demand skills.[28] In its submission to the Review, GM Holden cited additional shortages of calibration and electrical engineers and product designers (for example, clay modellers).[29]

The introduction of new technologies could lead to growing demand for skills in integrated design systems (for example, computer-aided design); simulation tools; competitive manufacturing; environmental skills; mechatronics and robotics; small business management; and materials handling processes.[30,31]

The age profile of the automotive workforce is similar to that of the broader manufacturing sector and all industries.[32] Nonetheless, 38.1 percent of the automotive workforce is aged 45 years or over[33] and would be eligible to leave the industry through retirement within 10 years. This could exacerbate difficulties in refreshing skills and attracting new staff in an industry characterised by "poor career perceptions, poor wages and conditions, and retention problems with experienced staff".[34]

Developing the skills

Education and training for the automotive industry are provided through a combination of institutions (for example, schools, universities and TAFEs), employer on-the-job training, and industry-specific relationships with training providers. Some automotive industry employers are also registered training providers.

Expenditure on training in the automotive components sector is 1.5 percent of the average wage and is marginally higher than for manufacturing.[35] Indications are that "industry investment is primarily

25 GM Holden, *Submission to the 2008 Automotive Review*, p. 80.
26 National Centre for Vocational Education Research, *Australian vocational education and training statistics, Employers' use and views of the VET system*, NCVER, Adelaide, 2007, p. 7, viewed at http://www.ncver.edu.au/statistics/surveys/seuv07/su07030.pdf
27 DEEWR, *Submission to the 2008 Automotive Review*, p. 16.
28 ibid., pp. 17–19.
29 GM Holden, *Submission to the 2008 Automotive Review*, p. 79.
30 Victorian Government. *Submission to the 2008 Automotive Review*, p. 21.
31 GM Holden, op. cit., p. 79.
32 DEEWR op. cit., p. 9.
33 ibid., p. 7.
34 Victorian Automobile Chamber of Commerce, *Submission to the 2008 Automotive Review*, p. 22.
35 FAPM, *Submission to the 2008 Automotive Review*, p. 58.

in on-the-job and in-house training. The reliance on on-the-job training means that industry–provider partnerships are an essential component to the provision of training".[36]

Information provided by the Federation of Automotive Products Manufacturers[37] indicated that formal educational qualification levels in the automotive components sector are similar to those in other manufacturing industries—see Table 9.5.

Table 9.5. Highest educational attainment in motor vehicle components manufacturing and other manufacturing

Qualification	Motor vehicle components manufacturing (%)	Other manufacturing (%)
Postgraduate, doctorate, masters and professional specialist	2	2
Graduate diploma and graduate certificate, professional specialist	1	1
Bachelor degree	8	9
Advanced associate diploma	6	6
Certificate I, II, III or IV	29	27
Year 11 + 12	25	25
Year 10, 9, 8 or below	23	24
Inadequately described	7	7
Total	100	100

Source: Federation of Automotive Products Manufacturers.

Ford noted that the formal educational qualifications among its 5,000 employees have risen significantly. For example, between 1995 and 2007, the proportion of employees with:

- postgraduate qualifications rose around fivefold, from 0.8 to 4.1 percent;
- graduate degrees almost doubled, from 8.2 to 15.3 percent;
- TAFE qualifications almost trebled, from 22.7 to 62.4 percent; and
- no post-secondary qualifications reduced by almost three-quarters, from 68.2 to 18.2 percent.[38]

Comparing the educational qualification data from the Federation of Automotive Products Manufacturers with Ford's indicates that formal educational qualifications are significantly higher among the employees of the motor vehicle producers (MVPs) than among those of automotive component manufacturers and 'other manufacturing'. In part, this could be indicative of the growing engineering and design roles of domestic MVPs within their respective global parent structures, as well as the outsourcing of lower value-added functions. It is also consistent with the higher wages and salaries paid by MVPs.

Nonetheless, the Federation of Automotive Products Manufacturers also cited anecdotal evidence that vehicle and component producers were concerned about the quality and relevance of skills of recent graduates and said the employers were having to provide much of the required skills and knowledge through on-the-job training because relevant formal training is not available.[39]

The motor vehicle industry is involved in a range of training initiatives with educational institutions. For example:

- Ford is involved in the Advanced Centre for Automotive Research and Testing, in collaboration with the University of Melbourne and the Victorian Government. The centre seeks to provide "the local automotive and transport industries with state-of-the-art infrastructure and highly skilled personnel".[40]
- Toyota has invested $1.5 million in conjunction with the Chisholm Institute of TAFE in establishing the Toyota Trades Training Centre.[41]
- Kangan Batman Institute of TAFE has relationships with a number of automotive firms, including Robert Bosch.[42]
- GM Holden acknowledged an adverse perception of the automotive industry among the potential recruiting pool, but also said that the "reality of the industry is one where high levels of automation have reduced manual handling, where work offers a variety of stimulating intellectual and technological challenges, and where workers are competitively remunerated". The firm "is working to increase awareness of careers in automotive design, and providing

36 House of Representatives Standing Committee on Employment, Workplace Relations and Workforce Participation, *Shifting Gears—Employment in the automotive components manufacturing industry*, HRSCEWR, Canberra, 2006, pp. 44–45.
37 FAPM, *Submission to the 2008 Automotive Review*, pp. 85–86.
38 Ford, *Submission to the 2008 Automotive Review*, p. 29.
39 FAPM, *Submission to the 2008 Automotive Review*, pp. 85–86.
40 Ford, *Submission to the 2008 Automotive Review*, p. 34.
41 Victorian Government, *Submission to the 2008 Automotive Review*, p. 23.
42 ibid., p. 24.

support to develop appropriate skill-sets for future automotive designers" (for example, with Monash University).[43]

Automotive Training Australia is responsible for the Automotive Manufacturing Training Package AUM00, and the Automotive Retail, Service and Repair Training Package AUR05. Package AUM00 covers "all aspects of vehicle manufacturing" including vehicle design, development, testing and compliance and the manufacture of body components and engines. Package AUR05 includes automotive retailing, parts warehousing, and vehicle servicing and repair. Package AUR05 "accounts for nearly 8 percent of all apprentices and trainees nationally (31,120 as at September 2007), and ranks number four in the top 20 most used training packages".[44]

Neither of these training packages is currently covered under the Industry Skills Council structure. Agreement "has not been reached about the industry advisory arrangements for [the] automotive industry and this has led to interim arrangements" which include funding for Automotive Training Australia by the Australian Government to 30 September 2008.[45]

The Australian Industry Group suggested that Manufacturing Skills Australia, which is one of the 11 existing national Industry Skills Councils, should provide coverage for the automotive industry.[46] Other stakeholders, including Automotive Training Australia[47] and the Victorian Government[48], supported the establishment of a separate Industry Skills Council for the automotive industry.

Establishing a separate automotive Industry Skills Council might involve some overlap of responsibility, and possible demarcation issues, for skills common across multiple industries, including manufacturing. To assist with resolving skills issues common across the automotive and other manufacturing industries, the Australian Government could establish a reference group to provide advice on such issues to Manufacturing Skills Australia. The reference group could come under the Automotive Industry Innovation Council proposed in Chapter 11.

43 GM Holden, *Submission to the 2008 Automotive Review*, pp. 78, 80.
44 ATA, *Submission to the 2008 Automotive Review*, p. 3.
45 DEEWR, *Submission to the 2008 Automotive Review*, p. 21.
46 AiG. *Submission to the 2008 Automotive Review*, p. 29.
47 ATA. Submission op. cit., p. 6.
48 Victorian Government, *Submission to the 2008 Automotive Review*, p. 23.

INDUSTRY RESTRUCTURING AND CONSOLIDATION

Restructuring—an ongoing theme

Within the automotive components sector, anecdotal evidence suggests that up to one-third of the 200 Australian automotive component firms could be at risk of exiting the industry over the next few years. This could be additional to the 52 Tier 2, 3 and 4 firms that have already moved out of the component sector in recent years.[49] Nonetheless, there are also positive examples in the sector through "strategic supply consolidations, resulting in more sustainable businesses in the long term" (for example, by Bosch, Futuris and Autodom).[50]

Contingent liabilities can be important for the entire supply chain during the restructuring and consolidation process. The size of such liabilities can influence a firm's value and/or its prospects for a full or partial sale as a going concern in the event that it suffers financial stress.

Automotive industry restructuring and consolidation are likely to be ongoing themes, with consequential effects on the range and value of products and services supplied by the local industry as well as on its employment and skills base. Industry and firm restructuring and consolidation can help to achieve economies of scale, improve productivity, build global links and attract further investment.

An orderly restructuring process

In its submission to the Review, William Buck argued that the key issue for the industry is not so much that closures are occurring and will continue to occur, but that 'unplanned' exits need to be addressed because they impose costs on:

- the automotive supply chain until alternative supply arrangements can be implemented;
- employees and employers in terms of lost contracts, unfunded employee benefits, worker dislocation and emotional impacts; and
- the industry's reputation as a reliable supplier and investment target.[51]

William Buck went on to say that there "would seem to be a good economic case for the government to play a role in helping manage the supply chain consolidation process, to minimise the instances

49 AiG, July 2008, *National CEO Survey—Driving on Innovation and Competitiveness*, loc. cit., p. 24.
50 William Buck, *Submission to the 2008 Automotive Review*, p. 4.
51 ibid., pp. 3–5.

of unplanned exits and therefore minimise the cost to the industry of the ongoing transition process".[52] Advanced Manufacturing Australia also suggested that "some well targeted assistance to facilitate the dialogue, planning and execution of industry consolidation plans would generate a significant return in terms of addressing the key structural impediments facing the industry".[53] The need for an 'orderly' restructuring process was a theme supported by a range of stakeholders, involving proposals for:

- establishment of an automotive industry authority, a vision statement and/or an adjustment plan (for example, involving government, industry and unions);
- establishment of a short-term industry restructuring fund (for example, to assist with addressing expansions, alliances, acquisitions, mergers, and contingent liabilities including, where appropriate, employee entitlements); and
- a framework agreement between industry and unions (for example, to address cooperative and constructive restructuring issues).[54]

> *The most pressing challenge is restructuring the auto component sector and individual firms in the industry. Managing workers' redundancy entitlements will be especially fraught. Ensuring orderly workforce reductions while simultaneously maintaining the confidence of its current and potential future workforce is critical for company CEOs and union leaders alike. This will only be possible if there is a high level of cooperation between employers, unions and the workforce. If the impending restructuring process merely becomes a struggle over who bears the burden of the financial cost for worker entitlements the industry as a whole will lose.*[55]

In its submission to the Review, the South Australian Government said that support should continue "for labour adjustment programs to provide job search, retraining and relocation assistance for employees who are displaced from the industry due to structural change".[56]

52 ibid., p. 3.
53 AMAus, *Submission to the 2008 Automotive Review*, p. 29.
54 FAPM, *Submission to the 2008 Automotive Review*, pp. 63, 67; FVIU et al., *Submission to the 2008 Automotive Review*, p. 26; South Australian Government, *Submission to the 2008 Automotive Review*, p. 4.
55 Workplace Relations Centre, *Industrial agreements and economice renewal: Where next for the Australian Automotive Industry?*, 25 June 2008, p. 4, provided to the 2008 Automotive Review by the Australian Manufacturing Workers' Union.
56 South Australian Government, *Submission to the 2008 Automotive Review*, p. 6.

Developing component producers' capabilities

Automotive Supplier Excellence Australia (ASEA) is a three-stage project managed by the Cooperative Research Centre for Advanced Automotive Technology (AutoCRC). ASEA aims to improve the capability of Australian automotive component firms through a competency assessment framework. The project is supported by the three motor vehicle providers, the Federation of Automotive Products Manufacturers, and the Victorian, South Australian and Australian Governments.[57]

ASEA Stage 1, completed in 2007, involved 100 companies and identified 10 key competency areas benchmarked against international best practice. Stage 2 was completed in 2008 and assessed 62 companies against each of the competencies. Each component company received a prioritised set of four to five improvement projects targeting key management and operational weaknesses. Participating organisations had invested $2 million by the completion of ASEA Stage 2.[58]

Among other things, Stage 2 of ASEA found that:

- the component sector is strongest in terms of its new product and customer focus;
- the sector needs to improve in terms of management and leadership; manufacturing and quality; supply chain integration and management; global sourcing and marketing strategies; and financial systems and practices;
- automotive component companies with larger turnovers (particularly more than $100 million) tend to outperform small companies (that is, those with a turnover of less than $50 million);
- multinational companies outperformed local companies; and
- exporting companies performed better than non-exporters.[59]

Key themes emerging from these results are that:

- global integration is a key determinant for success—for example, through global sourcing and marketing strategies; leveraging experience, infrastructure, technology and support from global parents; and competing internationally;
- bigger is better; and

57 AutoCRC, *Submission to the 2008 Automotive Review*, p. 3.
58 ibid.
59 ASEA, 'Stage 2: Supplier Evaluation and International Benchmarking', unpublished, June 2008.

- work is required to lift the quality of the component companies' internal management and processes, particularly among the smaller firms.

ASEA's Stage 2 research clearly highlighted the strengths and weaknesses of the automotive sector. Nonetheless, the real benefits to the industry will come through individual firms implementing performance improvement plans in the context of ASEA's Stage 3, which is not yet fully funded. In its submission, and as part of a future automotive industry support package, the AutoCRC sought funding of :

- $12 million under ASEA Stage 3 to rectify identified weaknesses in 62 automotive component firms. Nonetheless, ASEA is proceeding with a $1.8 million pilot phase involving 20 companies and funded from within the consortium; and
- $5 million per year to 2015 for ongoing supplier assessment and improvement projects using the ASEA model.[60]

The C21 Challenge Program is an initiative of the Victorian Government and Toyota to assist Victorian Tier 2 and 3 component producers build business competitiveness. The program covers six elements for each participating firm: a strategic diagnostic review; manufacturing efficiency; a workforce planning review and action plan; mentoring support; training in negotiation skills; and automotive industry information forums. The program is running between March and September 2008.[61]

Ford is expanding its Supplier Technical Assistance organisation, which provides technical, quality and business support to its suppliers. The company is targeting Tier 2 suppliers for specialist technical training. Ford also has insolvency specialists working with all key suppliers.[62]

Workplace reform

The Department of Education, Employment and Workplace Relations indicated that collective agreements cover about three-quarters of employees in the automotive sector. In the metal product and machinery and equipment manufacturing sectors, there were 1,252 collective agreements as at December 2007. Of these, more than three-quarters (961) are due to expire in 2008 or 2009.[63] Consequently, there is a significant window of opportunity to pursue further workplace reform in the near term for motor vehicle and automotive component producers who compete in similar labour markets.

Flexible work practices and a stable workplace relations environment are important, particularly as motor vehicle producers rely on lean manufacturing techniques and delivery of components on a just-in-time basis.

Disruptions to production at a key component supplier or at a motor vehicle producer can lead rapidly to the shutdown of the vehicle assembly line and to shutdowns through the supply chain. Consequently, stoppages can be very expensive in terms of lost production, penalties for delayed delivery, idle capital, lost wages, lost sales and the damage to a producer's reputation as a reliable supplier.

There was general acknowledgment among stakeholders that industrial disputes in the automotive sector have been at a historically low level in recent years. This is supported by ABS data indicating that, in the 10 years to 2008, there was a general downward trend in the number of working days lost due to industrial disputes for the metal product and machinery and equipment sectors.[64]

However, given the competitive pressures the industry is experiencing, a greater emphasis on improving productivity, reforming work and management practices, and promoting a productive workplace culture will be required if the Australian industry is to remain competitive in the longer term. While volume, economies of scale and innovation (broadly defined) remain the key determinants of productivity in the industry, more needs to be done to encourage high-performance workplaces and cost-competitive supply chains.

Support for industry adjustment

The key issue for orderly restructuring and consolidation of the automotive component sector is facilitating the 'transmission of business' while minimising the incidence of outright collapses of supplier firms. Wherever possible, such collapses need to be avoided in an industry where just-in-time delivery is paramount and shutdowns anywhere in the supply chain can rapidly and expensively reverberate throughout the whole industry. Some government intervention is considered essential to achieve this, particularly for the smaller Tier 2, 3 and 4 firms, which are under the most financial stress.

60 AutoCRC, *Submission to the 2008 Automotive Review*, p. 4.
61 Business Victoria, *C21 Challenge*, viewed at http://www.business.vic.gov.au/BUSVIC/GAP/1001/PC_62600.html
62 Ford, *Submission to the 2008 Automotive Review*, pp. 23, 27.
63 DEEWR, *Submission to the 2008 Automotive Review*, p. 30.
64 Australian Bureau of Statistics, *Industrial Disputes, Australia, Dec 2003*, cat. no. 6321.0.55.001, ABS, Canberra, March 2008.

Government support for 'transmission of business' could assist with strengthening firms' capabilities and securing their future viability as going concerns; facilitating mergers and acquisitions in the sector; and/or addressing contingent liability (for example, employee entitlements) or other factors that might act as barriers to effective and successful sectoral consolidation. Economic consolidation of plant and equipment and co-location of production also need to be addressed in that context.

If automotive employees are made redundant, then fair and reasonable structural adjustment assistance could be provided (possibly funded through an automotive industry restructure fund).

The ultimate objectives are to move towards greater economies of scale and internationalisation of production to build capacity and demand, and to enhance the viability of the Australian automotive supply chain. The imperative is to facilitate restructuring in the short term; consequently, the duration of government support should be limited to this critical period only. The recommendations at the end of this chapter have been framed with these objectives in mind.

The industry and the employees themselves clearly also have a role to play in restructuring. Company leaders from the automotive component sector and leaders of the major unions have begun negotiations on a framework agreement.[65] Such an agreement could:

- acknowledge that restructuring and consolidation will be a necessary part of assuring a vital Australian automotive industry into the future; and
- assist with assuring continuity of supply in an industry characterised by just-in-time delivery and high levels of international competition.

The Review supports an ongoing dialogue, involving governments, to ensure that the restructuring and consolidation process is effective in helping with an orderly transition to a more competitive and sustainable future for the Australian automotive industry.

65 Taylor L, 'Car Parts Maker Paid to Shut Down', *The Australian*, 19 June 2008, p. 1.

SUMMARY OF FINDINGS

- The automotive industry is a major employer in Australia, employing 64,800 people. Employment in the industry is forecast to decrease at an average rate of 1.5 percent per annum over the next five years.
- In order for it to remain internationally competitive, the Australian automotive industry's rate of productivity growth will need to increase substantially just to keep pace with its overseas competitors.
- The following skills categories are of significance to the automotive industry and are currently experiencing national or statewide shortages: engineers; accountants; fitters; metal fabricators; toolmakers; welders; motor mechanics; vehicle painters; vehicle body makers; general electricians; and product designers.
- Formal educational qualifications are significantly higher among motor vehicle producers' employees than among those of automotive component producers and manufacturing in general.
- Automotive industry restructuring and consolidation are likely to be ongoing themes, with consequential effects on the range and value of products and services supplied by the local industry as well as on its employment and skills base.
  - An orderly restructuring and consolidation process is required.
  - It is the smaller—those with less than $50 million annual turnover—Tier 2, 3 and 4 automotive component firms that are under the most financial stress and would benefit most from assistance with restructuring and consolidation.
  - A framework agreement negotiated by automotive component sector employers and unions, as well as ongoing dialogue with governments, can support the restructuring and consolidation process.
- Within the automotive components sector, research indicates that:
  - global integration is a key determinant for success—for example through global sourcing and marketing strategies; leveraging experience, infrastructure, technology and support from global parents; and competing internationally;

- bigger is better; and
- work is required to lift the quality of the component companies' internal management and processes, particularly among the smaller firms.

- There is a significant window of opportunity to pursue further workplace reform in the near term for motor vehicle and automotive component producers who compete in similar labour markets.

RECOMMENDATIONS

- The Australian Government should contribute to a short-term automotive industry restructure fund that aims to assist the Australian automotive supply chain improve economies of scale, enhance management capabilities, internationalise production to build capacity and demand, and enhance long-term sustainability.
  - Funding for the industry restructure fund should be part of the new Global Automotive Transition Scheme proposed in Chapter 11.
  - Payments under the industry restructure fund should be determined on a case-by-case basis by the responsible Minister, on advice from his or her department, taking into account 'transmission of business' issues including facilitating mergers and acquisitions in the sector; addressing, where appropriate, contingent liability or other issues that might act as barriers to effective and successful sectoral consolidation; consolidation of plant and equipment; and co-location of production. Where appropriate, fair and reasonable assistance should also be made available to employees made redundant through automotive restructuring.
  - The industry restructure fund should include support for developing the Australian automotive supply chain's management and operational capabilities and processes (similar to Automotive Supplier Excellence Australia, C21 and other existing initiatives).
  - Government funding for the industry restructure fund should be of a limited amount and duration (for example, $60 to $80 million over two years) to cover the immediate restructuring and consolidation needs of the automotive industry.
  - The automotive industry should contribute financially to the activities supported by the industry restructure fund.
- The automotive industry, unions, employees and governments should engage in an ongoing dialogue so that the restructuring and consolidation process is effective in helping with an orderly transition to a more competitive and sustainable future for the industry.
- A memorandum of understanding should be negotiated by motor vehicle producers, component suppliers and unions, and be facilitated by governments where appropriate. The memorandum of understanding should:
  - acknowledge that restructuring and consolidation are a necessary part of assuring a vital Australian automotive industry into the future; and
  - assist with assuring continuity of supply in an industry characterised by just-in-time delivery and high levels of international competition.
- The leadership dialogue between the component sector and unions should continue.
  - Whether this translates into a framework agreement is a matter for the participants. However, there are benefits to be gained from a shared understanding of the challenges that lie ahead and the need for improvements in competitiveness and productivity.
  - The issue of employee entitlements is also a matter where a leadership dialogue can assist the participants to more effectively manage the restructuring process.
- To assist with resolving skills issues common across the automotive and other manufacturing industries, the Australian Government should establish a reference group to provide advice on automotive skills issues to Manufacturing Skills Australia.
  - The reference group should come under the Automotive Industry Innovation Council proposed in Chapter 11.

CHAPTER 10:
VEHICLE SAFETY

INTRODUCTION

Consumer and government demand for safer vehicles and for reduced road trauma has led to increases and improvements in the safety features of vehicles and more stringent vehicle safety standards. Such safety features over the past decades have included the introduction of seat belts, frontal crumple zones, air bags and electronic stability control. Safety technologies at an early stage of market entry include forward collision and lane departure warnings and predictive braking.

However, it is important that the adoption of safety standards in Australia is consistent with international standards so that it facilitates market access and global supply chain integration for Australian manufacturers, designers, the tooling industry and vehicle importers. It is also important that the Australian standards do not impose on manufacturers additional requirements that could jeopardise mutual recognition of the certification of Australian-made vehicles to international standards, thereby raising the cost of participating in global markets.

Vehicle safety standards should also be consistent across Australian jurisdictions so as not to impose further costs on local manufacturers and importers seeking to meet varying requirements in different domestic markets.

VEHICLE SAFETY STANDARDS

Government responsibility for road safety is shared. The Australian Government administers the *Motor Vehicle Standards Act 1989* (MVS Act). The states and territories are responsible for road traffic regulation and enforcement through to driver training and licensing.

The object of the MVS Act is to set uniform national vehicle standards for vehicles supplied new to the Australian market. These standards are the Australian Design Rules, which aim to make road vehicles safe to use, control emissions from road vehicles and secure road vehicles from theft. The MVS Act renders inoperative any vehicle standard purported to be required by a state or territory government for a new vehicle.

Harmonisation with international standards

Australia is a signatory to both the 1958 and 1998 agreements administered by the United Nations Economic Commission for Europe (UNECE) on international technical harmonisation in the motor vehicle sector. The 1958 Agreement sets international vehicle regulations as UNECE regulations, and provides mutual recognition for product certification. Signatories to the 1958 Agreement include Australia, Japan, the Republic of Korea, New Zealand, France, Germany, the United Kingdom and the European Union.

The 1998 Agreement sets international vehicle regulations as global technical regulations. However, there is no mutual recognition of vehicle standards under this agreement. Signatories to the 1998 Agreement include Australia, the United States, Canada, China, Japan, the Republic of Korea, New Zealand, France, Germany, the United Kingdom and the European Union.

In accordance with the Agreement on Technical Barriers to Trade, the UNECE regulations and the

Australian Design Rules are performance based where possible. Performance-based standards are intended to avoid technical restrictions that are design prescriptive and to allow flexibility for manufacturers to meet regulatory requirements in a technology-neutral manner. As GM Holden noted, the performance-based approach "gives vehicle manufacturers the flexibility to achieve the performance requirements by new and innovative means, resulting in better and constantly improving safety technologies finding their way into new vehicles".[1]

The Australian Government's policy is to harmonise the national vehicle safety standards with these international regulations where possible. The majority of the Australian Design Rules incorporate the UNECE regulations. Very few submissions to the Review addressed the harmonisation of the Australian rules with the UNECE regulations. Those that did, such as GM Holden and the Australian Automotive Aftermarket Association, supported the current harmonisation process.

Mutual recognition

An important element of the 1958 Agreement is the mutual recognition of product certification. That is, the agreement allows for 'test once, accepted everywhere'. Signatory countries that have advised the United Nations of their willingness to be 'bound' by individual regulations may issue certification approvals under the agreement; these must then be accepted by other signatories who have also agreed to be bound by the relevant regulation or regulations. This facilitates global trade in automotive products by reducing the costs and complexities associated with exporting and importing. For example, Australian-made vehicles certified as meeting the relevant international regulations under the 1958 Agreement would not need to be crash tested or to undergo other certification processes when imported into other signatory countries. International recognition of the Australian certification process can potentially save millions of dollars in compliance costs when access to other markets is being sought.

Differences in international standards

Several submissions to the Review, including from the Australian Automobile Association, said that "efforts need to be made to ensure that standard safety required by cars sold in Australia should go beyond the basic Australian Design Rules, which essentially set a minimum standard".[2] In addition, the Victorian Government actively supports the mandating of electronic stability control and side curtain air bags in new passenger motor vehicles.

It is important to recognise that the Australian Design Rules set minimum technical standards. Efforts to encourage higher safety specifications in cars can take many forms. For example, fleet management strategies and advertising the benefits of particular technologies to educate consumers can be powerful mechanisms for directing consumer preferences to desirable technologies. However, attempting to regulate higher specifications in vehicles beyond internationally accepted standards runs the risk of imposing additional costs on vehicle manufacturers and affecting international agreement obligations—particularly where opportunities are available to enter other markets through mutual recognition of vehicle certifications. To take advantage of international certification provisions under the 1958 Agreement, signatories agree to accept product from other signatories where the product meets identified UNECE regulations and the parties have agreed to be bound by those regulations. If a signatory imposes a regulation more stringent than, or different from, the international regulation, it is not possible to take advantage of the mutual recognition provisions of the agreement. This would be the case if a state or territory government sought to impose standards more stringent than the UNECE regulations given effect through the Australian Design Rules.

Imposing regulatory requirements additional to, or different from, international standards also runs the risk of reducing the range of imported vehicle models made available for Australia—particularly if it means changing a production process, re-engineering a vehicle, or incurring additional testing costs to demonstrate evidence of compliance with a unique domestic requirement. As vehicles with leading-edge or expensive technologies may be a marginal investment proposition for a small market such as Australia, it could mean, paradoxically, the availability of vehicle models with these features is reduced.

Safety standards for vehicles—in-service and replacement parts

There can be significant variations in the levels of safety between new and older vehicles. The roadworthiness of older vehicles is the responsibility of the state and territory governments. Vehicles are to be subjected to an annual test or to a test when a vehicle is sold, re-registered, or required to clear a defect notice or a notice of unroadworthiness. Similarly, some replacement parts are subject to inspection when a vehicle is tested for its roadworthiness.

1 GM Holden, *Submission to the 2008 Automotive Review*, p. 85.
2 AAA, *Submission to the 2008 Automotive Review*, p. 19.

In its submission to the Review, the Australian Automotive Aftermarket Association discussed the lack of a uniform national vehicle inspection program which "creates a situation in many states where a vehicle can be in-service for over 15 years without ever being inspected to ensure it meets basic environmental and safety benchmarks".[3] Very few submissions commented on the issue and the Australian Automotive Aftermarket Association did not recommend a prescription for it.

States and territories usually require vehicles to comply with the Australian Design Rules applicable when the vehicle was first supplied to the market.

Product safety standards

One issue raised during the submission process related to the lack of consistent national regulations covering product standards, vehicle modification and consumer affairs for aftermarket products. For example, the Australian Automotive Aftermarket Association reported that there are 24 standards committees relating to aftermarket products, each state and territory has legislative authority to regulate the sale and final use of aftermarket components, and there is an overlap of consumer affairs regulations between the Commonwealth and the states and territories. This can add to the compliance burden for manufacturers and importers of aftermarket parts and raise costs.

It should be noted that state transport authorities have released a National Code on Light Vehicle Construction and Modification, and all jurisdictions are working to implement it, albeit with different time frames.

The Australasian New Car Assessment Program

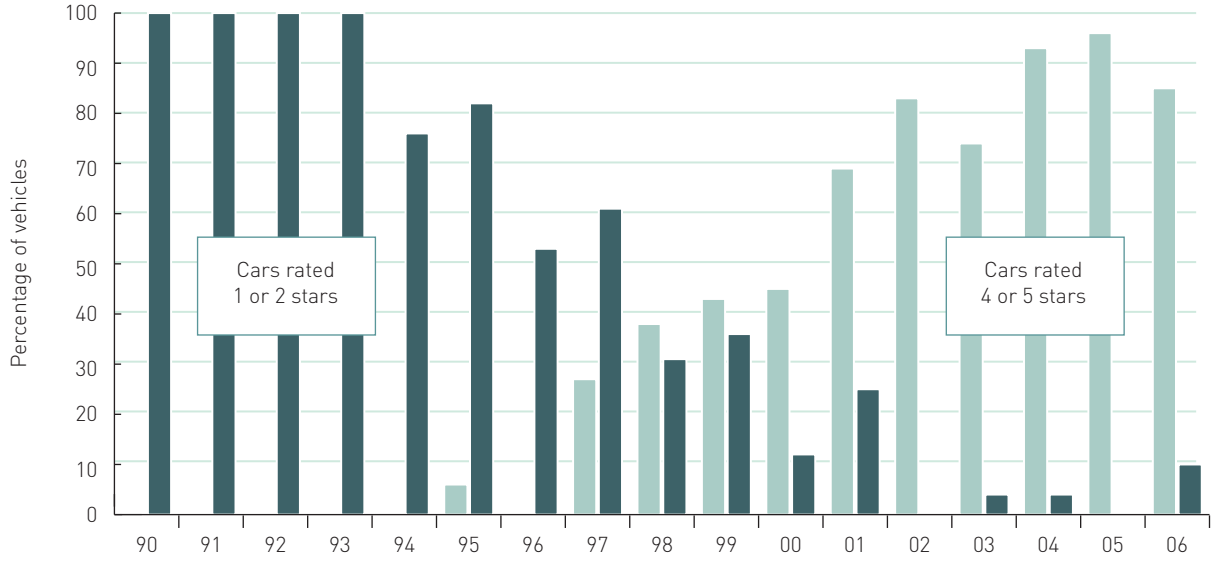
The Australasian New Car Assessment Program (ANCAP) provides consumers with information on the level of occupant protection provided by vehicles in serious front and side crashes. Participation in ANCAP testing is voluntary for vehicle producers and importers. The program is supported by Australian and NZ automobile clubs, the state government road and transport authorities of New South Wales, Victoria, South Australia, Queensland, Tasmania and Western Australia, the NZ Government and the FIA Foundation.

The Australian Automobile Association reported that:

> *over time, car safety has improved markedly with advances in seat belt design, addition of air bags, power assisted disc brakes, improved body structures and better driveability. The improvement is illustrated in ANCAP results which show that when the program started, all vehicles tested scored just 1 or 2 stars for safety, though now most cars score 4 or 5 stars.*[4]

Figure 10.1 illustrates this.

Figure 10.1. Changes in vehicle safety ratings, 1990 to 2006[5]



Source: AAA analysis of ANCAP data.

3 AAAA, *Submission to the 2008 Automotive Review*, pp. 3–4.

4 AAA, *Submission to the 2008 Automotive Review*, pp. 17–18.

5 ibid., p. 18.

However, locally made passenger motor vehicles currently achieve an ANCAP rating of only four stars, mainly due to the lack of side curtain air bags as a standard feature on base models.

To raise community awareness about vehicle safety, the Australian Automobile Association proposed a mandatory labelling of ANCAP star ratings on vehicles sold in Australia and that, where ANCAP tests have not been conducted for certain vehicles, this be recorded on the label. The association also proposes that the Australian Government assist with funding for ANCAP. However, it is the Australian Design Rules with which new vehicles must comply before entering the market, and not an ANCAP rating.

SUMMARY OF FINDINGS

- New vehicles sold into the Australian market have become safer over time due to advances in technologies such as seat belts, disc brakes and air bags.
- The harmonisation of the Australian Design Rules with the United Nations Economic Commission for Europe regulations removes barriers to trade, and facilitates participation in global markets by the Australian automotive industry.

RECOMMENDATIONS

- Vehicle safety standards should adhere to the Australian Design Rules and be uniform across all states and territories.
- Any changes to vehicle safety standards should also be consistent with Australia's international obligations and not impact on mutual recognition matters (and hence risk market access restrictions for Australian-made vehicles).

CHAPTER 11:
FUTURE AUTOMOTIVE ASSISTANCE ARRANGEMENTS

INTRODUCTION

Nearly all nations still provide assistance to many parts of their economies. For example, it has been estimated that in 2004 developed countries provided tariff and subsidy support of around US$280 billion to their agricultural sectors alone.[1] For manufacturing, many developed economies still provide tariff protection, including tariff escalation along the production chain, and use anti-dumping actions to restrict import competition.

The automotive sector, as a subset of manufacturing, is no different. Countries, including Australia, still support their automotive sectors through tariffs and the application of non-tariff barriers. They also have active investment attraction policies aimed at increasing inward investment in the automotive sector, as discussed in Chapter 5.

LEVEL OF ASSISTANCE TO THE AUSTRALIAN AUTOMOTIVE INDUSTRY

In an international context, Australia's automotive tariffs are relatively low, and its investment attraction policies are more transparent and less generous than those offered by some other countries. The support offered is designed to help the industry make the transition to a more competitive environment. Nevertheless, the level of assistance to the Australian automotive industry is high compared with support for other domestic industry sectors in Australia. For example, in 2006–07, motor vehicle and parts manufacturing received combined budgetary and tariff assistance of $1.3 billion, or nearly $4,000 per vehicle manufactured domestically.[2,3] The only other sector to receive a higher absolute dollar value of assistance was the food, beverage and tobacco manufacturing sector.

Another measure of assistance is the effective rate of assistance, which is "a measure of the net assistance to an industry divided by its unassisted value added"—that is, the net assistance to an industry relative to its contribution to the economy.[4] In 2006–07, the Productivity Commission estimated the effective rate of combined assistance to the automotive industry was 12.2 percent.[5] This was the fourth highest, behind dairy farming (15.1 percent), textiles, clothing, footwear and leather (13.5 percent) and fisheries (12.7 percent). The levels of assistance to the Australian automotive industry have, however, declined since 1985, when the industry was protected by tariffs of 57.5 percent and import quotas. In 1984–85, the effective rate of assistance to the industry was about 140 percent.

1 Anderson, K, Martin, W, Valenzuela, E, *The Relative Importance of Global Agricultural Subsidies and Market Access*, World Bank, November 2005, p. 1.

2 Productivity Commission, *Trade and Assistance Review 2006–07*, Annual Report Series, Productivity Commission, Canberra, 2008, Table 2.7, p. 2.16.

3 Budgetary assistance includes direct budgetary assistance, agricultural pricing and regulatory assistance.

4 Productivity Commission 2008, *Trade and Assistance Review 2006–07*, op. cit, p. 2.12.

5 ibid., Table 2.8, p. 2.17.

EFFECT OF ASSISTANCE ON CONSUMERS, INDUSTRY AND THE ECONOMY

Assistance to the automotive industry comes at a cost to other industries and to consumers. The tariffs mean buyers of imported vehicles and components pay a tax to the Government, and purchasers of domestically produced vehicles and parts pay a subsidy to domestic manufacturers because of the price-raising effect of the tariff. Budgetary assistance to the industry affects other industries and consumers since tax revenue has to be raised or diverted from other uses.

Assistance to the industry can also disadvantage the economy in general, and other sectors in particular, by distorting prices and diverting resources away from more efficient uses. For example, removing assistance from the automotive industry would help the mining, agriculture, services and non-automotive parts of the economy. The industry itself would save $724 million per annum on its input costs from the abolition of all tariffs, including the abolition of the automotive tariffs.[6]

REASONS FOR ASSISTANCE

There are many reasons that governments provide support to industry, even though the support might disadvantage other economic sectors. The reasons include government intervention to generate net benefits through addressing market failures such as positive externalities associated with spillovers and R&D, information gaps, skills development and business networking. Another reason for support is to help an industry through a structural adjustment process—that is, to help an industry make the transition to being a stronger, more economically sustainable one. This can lead to a leaner and more competitive industry and help to ensure that an industry does not prematurely exit—that is, once an industry is lost, it is difficult to reformulate it when conditions change. The loss of an industry also has impacts on other sectors due to its economic links and spillover benefits.

When it was undertaking the review of post-2005 automotive assistance in 2002, the Productivity Commission saw merit in policy certainty and the continuation of industry support through the Automotive Competitiveness and Investment Scheme (ACIS) as a transitional measure to a more economically sustainable industry linked to further tariff declines.[7] It also found a "settled path for future automotive assistance would serve to reduce one source of uncertainty impacting on investment and production decisions in the industry".[8] The commission recommended that the tariffs on passenger motor vehicles and parts thereof be reduced to 5 percent by 2010, and the reduction be cushioned by an extension of the ACIS program.

In its response to the Productivity Commission, the Australian Government agreed to reduce the tariffs on passenger motor vehicles and parts thereof to 10 percent in 2005 and to 5 percent in 2010, as well as ACIS budgetary assistance worth about $4.2 billion over the period 2006 to 2015 inclusive. The level of funding and the duration of the scheme went beyond what was recommended by the commission.

A CHANGED ENVIRONMENT

The environment in which the automotive industry is operating has changed since the last review, by the Productivity Commission in 2002. The Australian dollar has appreciated significantly against the currencies of major automotive producing countries, affecting the competitiveness of the local industry. For example, the Australian dollar has appreciated 77 percent against the US dollar since 2002. In addition, it has appreciated 40 percent against the Japanese yen, 27 percent against the Korean won, and 36 percent on a trade-weighted basis. A further appreciation in the Australian dollar would continue to erode the effectiveness of tariff protection and adversely affect the international competitiveness of the industry. In addition, the profitability of the industry has fallen to such an extent that ACIS is underpinning the financial performance of the sector.

Australia has also entered into several free trade agreements, including with the automotive producing countries of the United States and Thailand. Changing consumer tastes and fuel price increases have seen the market share of local vehicle producers falling from 30 percent in 2002 to 19 percent in 2007. In addition, there are many emerging challenges being driven by environmental concerns and the industry's need to contribute to greenhouse gas abatement. The extent of the impacts of these changed circumstances could not have been anticipated in 2002.

Since the 1980s, the Australian automotive industry has become more open and efficient. It has

6 ibid., Table 2.2B, p. 2.5.

7 Productivity Commission, *Review of Automotive Assistance Inquiry Report*, Report No. 25, PC, Melbourne, 2002, pp. 181, 183.

8 ibid., p. 182.

responded to increased exposure to international competition through enhanced global integration and a more export-oriented focus. What has not changed, however, is that the industry is still subject to the structural adjustment process. As in 2002, policy certainty continues to be a central theme underpinning future investment in the domestic industry. The main difference now is that the horizon for policy certainty sought by the industry extends out to 2020.

IMPACT OF CHANGED AUTOMOTIVE ASSISTANCE ARRANGEMENTS

On 14 April 2008, the Hon Chris Bowen MP, Assistant Treasurer and Minister for Competition Policy and Consumer Affairs, tasked the Productivity Commission with modelling the economy-wide effects of future assistance options. The policy options suggested by the Review covered the gamut of possible assistance arrangements—from the removal of all support through to maintaining the current tariffs and increasing funding under ACIS. The Review also requested modelling of a scenario in which the Australian and US dollars achieved parity.

The Productivity Commission released its report, *Modelling Economy-wide Effects of Future Assistance Arrangements*, on 5 June 2008.[9] The commission's modelling found that reducing the passenger motor vehicle (and parts thereof) tariffs from 10 to 5 percent and discontinuing ACIS would increase GDP by up to 0.06 percent and (public and private) consumption by 0.002 percent. It would also lead to an expansion in the output of the agriculture, mining, food processing and services sectors, and a contraction in output from the manufacturing sector.[10]

For the automotive industry, the reduction in tariffs from 10 to 5 percent and the discontinuation of the scheme would lead to output from automotive assembly and component manufacturing falling by 4.6 and 1.4 percent respectively. Employment in these sub-sectors would fall by 5.5 and 1.8 percent respectively.[11] At the regional level, the changed policy environment would lead to an expansion in gross state product for all jurisdictions with the exception of Victoria, South Australia and the Australian Capital Territory, the two states being the more automotive-intensive jurisdictions.[12] Victoria and South Australia, and to a lesser extent New South Wales, would lose a small proportion of their populations to the resource-intensive jurisdictions of Western Australia, Queensland and the Northern Territory.[13]

The economic benefits from assistance reductions come largely from reducing the tariff—removing or reducing ACIS has a much smaller effect. This is illustrated in reference case R3[14]: removing the scheme with no change in the tariff produces very small GDP gains and a decline in consumption (0.003 and -0.18 percent compared to the base case effects of 0.063 and 0.02 percent respectively). The result stems from the distortion to prices imposed by the tariff, which does not occur under ACIS.

The reduced assistance leads to a resource expansion effect. The resource expansion effect, in turn, involves an increase in investment and this comes from two sources. First, the reductions in assistance reduce the cost of automotive products, which reduces the cost of capital. Second, the efficiency gains increase real wages, which encourages substitution of capital for labour. Reference case R4[15] removes the resource expansion effect with the result that there are negligible gains to GDP and a decline in consumption (0.004 and -0.008). The gain from the resource expansion effect must be viewed in light of an economy experiencing an investment boom and some supply-side constraints.

The Productivity Commission's modelling found that a real appreciation in the terms of trade generated by a continued 'minerals boom' would dwarf the impacts of any changed assistance arrangements.[16]

The Productivity Commission also ran various simulations, including changing the export demand elasticities from 10 to five. This is important because lowering the export demand elasticities results in a larger terms-of-trade effect and a smaller increase in exports. The lower elasticities are also consistent with the argument of proponents of the optimal tariff—that is, when tariffs are already low, reducing them further results in the terms-of-trade effects outweighing the benefits of allocative efficiencies. The commission reported that, with the lower export demand elasticities, the effect of reducing the tariff to 5 percent and discontinuing ACIS would result in an increase in GDP of 0.05 percent and a fall in (private and public) consumption of -0.01 percent.[17]

9 Productivity Commission, *Modelling Economy-wide Effects of Future Automotive Assistance, Research Report*, PC, Melbourne, 2008.
10 ibid., p. 49.
11 ibid., Table 4.2, p. 53.
12 ibid., Table 4.3, p. 55.
13 ibid., Table 4.3, p. 54.
14 ibid., Table 4.1, p. 49.
15 ibid.
16 ibid., Table 2, p. XVIII.
17 ibid., Table 4.5, p. 60.

The simulations also showed that if the cost of borrowing rises with the demand for capital, or if labour mobility is constrained, then both simulations would result in a reduction of (private and public) consumption of -0.07 and -0.06 percent respectively.[18]

Finally, it is noted that economic modelling becomes less insightful as the policy shock becomes smaller. This is because the resource impacts are smaller and can be confounded by 'noise' from the many simplifying assumptions. For this reason, while the modelling is an important input to deliberations, it needs to be complemented by analysis of the many dynamic factors affecting the competitiveness and contribution to the economy of the automotive industry.

AUTOMOTIVE INDUSTRY SPILLOVERS

As discussed in Chapter 6 and Appendixes E and F, the Australian automotive industry is one from which technology spillovers are generated. The spillovers are, however, relatively concentrated. The industries that are among those receiving a large amount of spillovers from the automotive industry are machinery and equipment, other manufacturing, and the other transportation equipment industries (mostly railroad equipment and other transportation equipment).

There are additional spillovers, other than technology spillovers, as identified in the studies reported in the appendixes. Such benefits and spillovers include the application of automotive-related engineering and production capabilities to other industry sectors, transfer of competencies and capability development to suppliers; transfer of automotive-related management principles to other industry sectors; and the creation of training programs that benefit non-automotive-related firms.

These spillovers reflect the important links the automotive sector has to the heavy engineering sector of the economy—it is the largest industry in the sector, one that requires globally competitive standards in products and processes and one that has subsidiaries of major international companies. The automotive industry is integral to Australia's capabilities in elaborately manufactured goods.

18 ibid.

VIEWS IN SUBMISSIONS

Automotive Competitiveness and Investment Scheme

The local motor vehicle producers and component producers contend that ACIS has been critical to the industry's ability to attract renewed international investment and increase expenditure on R&D in the face of intensifying competitive pressures. For example, GM Holden maintains that ACIS, in combination with other government incentive schemes, has provided support for large-scale capital investment in Australia, including the High-Feature V6 Engine plant at Fisherman's Bend and the new VE Commodore.[19] In addition, Ford stated it had "committed to a suite of initiatives"—including design, engineering and manufacture of the new model Falcon and Territory—on the back of the introduction and implementation of ACIS.[20] Futuris also stated that ACIS has been a major factor in the company's expansion both in Australia and internationally.

Yet it is difficult to measure the extent to which ACIS has been the key factor in inducing further investment in R&D. According to analysis by the Productivity Commission, a comparison of pre- and post-ACIS R&D expenditure does, on the face of it, reveal strong growth in R&D spending, with 2 percent growth in the three years prior to the scheme compared to 30 percent after the scheme was introduced.[21] However, automotive industry business expenditure on research and development (BERD) has plateaued in recent years and fallen behind the growth in BERD for the manufacturing sector in particular and all industries in general. This is supported by the NRMA, which noted that the growth in automotive BERD "needs to be placed in context of other underlying trends in the manufacturing sector with comparative figures [for R&D growth for the entire manufacturing sector] of -1 percent and 17 percent respectively".[22] Thus, while ACIS is likely to have played some part, the expansion in automotive industry R&D seems to have also been driven by other non-ACIS related factors affecting the manufacturing sector.

Overall, it seems that ACIS has served the industry well. ACIS has provided support for capital investment by the motor vehicle producers and Tier 1 companies. This support has assisted the supply chain, which is

19 GM Holden, *Submission to the 2008 Automotive Review*, p. 40.
20 Ford, *Submission to the 2008 Automotive Review*, p. 25.
21 Productivity Commission, *Trade and Assistance Review 2006–07*, Annual Report Series, Productivity Commission, Canberra, 2008.
22 NRMA, *Submission to the 2008 Automotive Review*, p. 19.

reliant on the domestic production of vehicles and supplies Tier 1 companies.

There has been an increase in the level of BERD undertaken by the industry. However, BERD has plateaued in recent years and has not kept pace with the growth in manufacturing or total BERD. The automotive industry's share of manufacturing BERD fell from 22 percent in 2002–03 to 17 percent in 2005–06, suggesting that ACIS is not encouraging continued growth in R&D expenditure.

ACIS has also facilitated investment in plant and equipment and the introduction of new vehicle models, and funded the expansion of some sectors of the supply chain.

On the other hand, as mentioned, ACIS has propped up the profitability of the industry. This suggests that to some extent ACIS has kept marginal firms in the industry and inhibited rationalisation and consolidation. This may have acted to restrain economies of scale and productivity growth.

Because ACIS funds are paid as credits, some firms in the supply chain cannot use the credits to import automotive products and must therefore sell the credits. In addition, the credits can be used to import components rather than for the purchase of domestically produced components. Changing from credits to grants would restore neutrality between the treatment of domestic and foreign-based component producers. ACIS has also encouraged the development of a secondary market so as to facilitate the trade in duty credits (so those firms that cannot use the credits can sell them), which has led to leakage from the system in the form of brokerage fees (paid as credits).

Tariffs

In its submission to the Review, the NRMA stated that a tariff rate of 5 percent "will do next to nothing to protect the automotive industry, and will really just serve as an extra tax on cars that are imported".[23] Similarly, the submission from the Department of Foreign Affairs and Trade referred to the benefits brought by the liberalisation of tariffs in the form of greater choice and cheaper products for Australian consumers and businesses. Its submission also noted the productivity benefits to the industry brought by the tariff reduction: "As the industry has adjusted, it has become more efficient, more closely integrated into global supply chains and more focussed on niche capabilities and markets".[24] In addition, tariff protection tends to shift productive resources from industries that are not protected to those that are, with the department noting that "assistance to the industry nevertheless continues to raise the costs and lower the competitiveness of other sectors (such as the services sector), which utilise the industry's output. Sales to private firms account for more than half of Australian-made vehicle sales on the domestic market".[25]

On the other hand, a number of submissions (including from all three domestic motor vehicle producers, some component producers, the unions, and both the Victorian and South Australian Governments) raised concerns about the potentially negative impact on the Australian industry of the scheduled tariff reduction. One concern was the need to reduce the potential for disruptive adjustment within the sector during a time of intensifying competition from high-volume, low-cost producers. Another was the simultaneous boon to imports and drag on exports arising from the increase in the Australian dollar from US56 cents in 2002 (when the current tariff schedule was implemented) to well over US90 cents in mid-2008.[26] In addition, the industry is concerned that Australia's tariff reduction policy is placing the domestic industry at a competitive disadvantage as little improved access for Australia's exports is being realised.[27] Several submissions suggested that further tariff reductions below 10 percent should be contingent on substantive progress in multilateral negotiations on trade liberalisation.

OPTIONS FOR REPLACING THE AUTOMOTIVE COMPETITIVENESS AND INVESTMENT SCHEME

The Automotive Competitiveness and Investment Scheme provides transitional assistance to help the industry adjust to a lower tariff and more internationally competitive environment. Assistance to the industry for the period 2011 to 2015 should reflect this, and the funding should be appropriate to help the industry continue to adjust to a more internationally competitive environment. The continuation of assistance can also help the industry

23 ibid.

24 DFAT, *Submission to the 2008 Automotive Review*, p. 5.
25 ibid, p. 7.
26 South Australian Government, *Submission to the 2008 Automotive Review*, p. 10.
27 See, for instance, Toyota's submission to the Review at page 51. Toyota also notes (p. 45) "that most countries with a similar scale of production have an import tariff between 2.5 times and 9 times the scale of Australia's".

meet the changed environment caused by a strong appreciation in the Australian dollar, high oil prices, changed consumer preferences, cleaner emissions requirements and new free trade agreements.

The level of funding for capped assistance could therefore be reduced from the current $2 billion over five years to 2010 to $1.5 billion over the five years to 2015. This is higher than the current legislated $1 billion over the five years to 2015 but reflects the changed environment, as well as the need to promote consolidation, capability improvement and improved R&D investment outcomes. The support can lead to higher levels of innovation, improved economies of scale, better workplace relations, higher skills and increased productivity. The new support arrangements should be less passive than current assistance arrangements, and should positively influence firm and industry behaviour so as to help the industry continue its transition to a more internationally competitive one, and one that is able to meet the challenges of a lower carbon economy in the longer term. A more productive and competitive industry also has benefits for the rest of the economy.

The funding therefore covers the suite of initiatives outlined in Chapters 7, 8 and 9, which can be funded from within the tranche of $1.5 billion, and which would be brought forward for this purpose. The Green Car Innovation Fund would be additional to the $1.5 billion.

Alternatively, the suite of initiatives announced in Chapters 7, 8 and 9 could be funded from a separate allocation of monies over and above the $1.5 billion available for capped assistance. The fund would be additional to both the $1.5 billion and the separate allocation.

The level of assistance should continue beyond 2015, and a further five-year tranche of $1 billion to 2020 should be made available to the industry to complete the transitional assistance process. Capped funds should continue to be split 55:45 between the motor vehicle producers and the supply chain. This funding should be 'front-loaded' and phased down over the five-year period. Assistance should cease at the end of 2020.

The funding mix under the assistance arrangements should be changed to offset the impact ACIS has had on retaining marginal firms in the industry, to more appropriately target R&D and to remove the anomaly in providing more assistance for the production of vehicles for the domestic market and New Zealand compared with assistance for production of vehicles for export to other markets.

The last factor can be addressed by making the production of all vehicles subject to the same claiming process and formula. That is, all production will receive both capped and uncapped funding. This would also increase the modulation rate used to allocate credits to the motor vehicle producers. In addition, the overall suite of new measures (outlined below) raises the level of assistance to the supply chain, and lifts the proportion of assistance going to the supply chain.[28]

Motor vehicle producers should continue to receive assistance based on production. This helps smooth out the 'lumpiness' of investment in plant and equipment and R&D associated with the introduction of new models. The changed arrangements should apply from 2010.

Facilitating the rationalisation process to achieve economies of scale and productivity improvements can be helped by tightening the dependency threshold for the component producers (excluding the service providers and the machine tooling producers). Currently, this is set at $500,000. Raising this to, say, $2 million would exclude marginal firms from assistance and increase the funds available to larger, more viable firms. It might also encourage restructuring among smaller firms and help lead to better economies of scale. The rationalisation process can be further facilitated through the 'transmission of business' initiative discussed in Chapter 9.

The loadings currently applying under ACIS (to uplift claims for investment in plant and equipment and in R&D) effectively act to reduce the modulation rate as assistance is capped. Removing the loading will increase the modulation rate and ensure greater certainty in investment decisions by firms in the supply chain—this is discussed further below.

In addition, some of the eligible expenditure items for R&D that can be claimed by the supply chain under ACIS are generous. For example, firms can claim costs associated with recruitment and management. Streamlining the eligible expenditure items will help ensure that claims more accurately reflect R&D activities. It will also help raise the modulation rate.

Removing the loadings and reducing the eligible expenditure items can be complemented by an increase in the rate for claims of eligible R&D.

28 The supply chain's share of total assistance increases by around 3 percentage points.

Currently, it is 45 percent. This could be raised to 50 percent. To further encourage R&D, the rate for plant and equipment claims can be reduced from its present 25 percent to 15 percent.

The modulation rate is used to adjust claims to ensure that the capped pool of funding is not exceeded. It is currently around 0.63 percent. Because the modulation rate varies and is not close to unity, it can act as a disincentive for investment since there is no certainty about the ACIS credits that can be claimed for such investment. Changing the current support arrangements to reflect the above measures would act to increase the modulation rate and introduce greater certainty for eligible investment.

As discussed in Chapter 9, there are deficiencies in management and leadership, manufacturing and quality, and supply chain integration skills in the smaller firms in the supply chain (those under $50 million of turnover). The Automotive Supplier Excellence Australia (ASEA) Stage 3 process and similar programs run by the motor vehicle producers, government and business (such as Enterprise Connect and C21) can help lift these capabilities. Government assistance to these firms could be tied to them undertaking and implementing a capabilities improvement program. This would be targeted at firms that have not participated in supplier capability development programs. It would be a separate pool of funds and would help to compensate the supply chain for the additional assistance given to the motor vehicle producers from uncapping the credits available for production for export. Firms would also need to contribute a small payment for the capabilities improvement program. Service providers could include ASEA, C21, Enterprise Connect, the motor vehicle producers or other bodies.

Assistance to the industry should be changed from duty credits to grants. This would raise the import-weighted average automotive tariffs for cars and components, and help equalise the tariffs applying between automotive goods. It would also help offset any impact that future free trade agreements may have in lowering import duties below the available duty credits. Changing from duty credits to grants would assist administration of the program and prevent leakage of assistance.

Given the changes outlined above and those discussed in Chapters 7, 8 and 9, the name of the assistance program should be changed to the Global Automotive Transition Scheme to better reflect the intent of the new scheme. The new arrangements should take effect in 2010, the last year of the current tranche of funding under ACIS Stage 2 and when tariffs are legislated to fall. This excludes those elements of the new arrangements that are brought forward ahead of 2010.

TARIFF OPTION

A reduction in automotive tariffs to 5 percent in 2010 could provide net benefits to the economy and to consumers. It would also continue the structural adjustment process the industry has been undergoing since the mid-1980s. Taking into account Australia's current free trade agreements, the import-weighted tariff under the proposed transitional assistance arrangements would be between 3 and 4 percent from 2010.

According to the Productivity Commission, reductions in automotive tariffs would have greater economic benefits than reducing ACIS. This effect arises from the increase to prices imposed by tariffs, which does not occur with reducing a production subsidy such as ACIS. It is also consistent with Australia's general trade reform agenda and with any possible tariff commitments arising from the Doha Development Agenda.

OTHER MEASURES

The Australian and state governments have provided incentives to companies within their jurisdictions to encourage investment in R&D and training. Many other international economies offer such incentives. The use of these incentives, however, can lead to increased competition between the states to attract investment. Such competition allows companies to play one state off against another and can lead to a suboptimal outcome—with the incentives offered being potentially in excess of the benefits of such investment. To improve this, a dialogue between the Commonwealth and the states and territories could be initiated with a view to ensuring that investment incentives are not overly generous and that the benefits exceed the costs of providing such assistance.

The states and territories could also consider the harmonisation and reduction of stamp duties, vehicle registration and compulsory third-party insurance through forums such as the Council of Australian Governments or the Council for the Australian Federation. This would facilitate the purchase of new (or newer second-hand) vehicles and help to reduce the average age of the in-service vehicle fleet. An

added benefit would be a reduction in greenhouse gas emissions.

The establishment of an Automotive Industry Innovation Council, with high-level representation from the motor vehicle producers, component suppliers, unions, research and academic organisations, and government, can facilitate strategic dialogue on issues affecting the industry and measures to improve the innovation and productivity performance of the industry. The council could provide advice and oversight in relation to the new transitional arrangements applying to the industry. As noted in Chapter 9, the council could also include a reference group that provides advice on automotive skills issues to Manufacturing Skills Australia (the Industry Skills Council having primary carriage for manufacturing industry skills development). The establishment of an Automotive Industry Innovation Council was in the Government's pre-election platform. Funding for the council should come from the Global Automotive Transition Scheme.

One issue raised during the Review process concerned automotive products being on the Excluded Goods Schedule. This means that an importer of a product cannot apply for a Tariff Concession Order (TCO) to import it duty-free. A TCO can provide for duty-free entry of certain goods where there is no local industry that produces those goods. Once a TCO is granted for a particular good, it is available to all importers of the good. However, allowing TCOs for automotive goods would undermine the funding base of the automotive assistance arrangements by reducing tariff revenue.

RECOMMENDATIONS

- A new, retargeted transitional program titled the Global Automotive Transition Scheme should be legislated in 2009 and commence in 2010. The Global Automotive Transition Scheme would complement, and be additional to, the Australian Government's Green Car Innovation Fund.
- There are three options for funding the Global Automotive Transition Scheme and other measures recommended in this report. These are:
  - *Option 1*: Funding for the Global Automotive Transition Scheme over the five years to 2015 (inclusive) should be $1.5 billion in capped assistance. An additional tranche of funding of $1 billion in capped assistance should be provided from 2016 to 2020, with this front-loaded and reducing to zero.
    - The funding also covers the industry restructuring fund, Team Australia Automotive, the Automotive Ambassadors, the Automotive Industry Innovation Council and the changed LPG Vehicle Scheme arrangements. These initiatives should commence in 2009.
    - The Green Car Innovation Fund, worth $500 million, should be brought forward to 2009.
  - *Option 2:* Funding for the Global Automotive Transition Scheme over the five years to 2015 (inclusive) should be $1.5 billion in capped assistance. An additional tranche of funding of $1 billion in capped assistance should be provided from 2016 to 2020, with this front-loaded and reducing to zero.
    - The funding also covers the industry restructuring fund, Team Australia Automotive, the Automotive Ambassadors, the Automotive Industry Innovation Council and the changed LPG Vehicle Scheme arrangements. These initiatives should commence in 2009.
    - Funding for the Green Car Innovation Fund should be brought forward to 2009 and, if successful, the Fund should be doubled from $500 million to $1 billion and extended beyond its initial five years.
  - *Option 3:* Funding for the Global Automotive Transition Scheme over the five years to 2015 (inclusive) should be $1.5 billion in capped assistance. An additional tranche of funding of $1 billion in capped assistance should be provided from 2016 to 2020, with this front-loaded and reducing to zero.
    - A further tranche of funds should be made available to cover the industry restructuring fund, Team Australia Automotive, the Automotive Ambassadors, the Automotive Industry Innovation Council and the changed LPG Vehicle Scheme arrangements. These initiatives should commence in 2009.
    - Funding for the Green Car Innovation Fund should be brought forward to 2009 and, if successful, the Fund should be doubled from $500 million to $1 billion and extended beyond its initial five years.

The Review recommends Option 3.

- Other recommended components of the Global Automotive Transition Scheme are:
  - Funding for both the motor vehicle producers and the supply chain should be split 55 percent (to vehicle producers) and 45 percent (to the supply chain) after monies for the additional programs are either deducted from the capped pool or allocated separate funding.
  - Assistance should be in the form of grants and not duty credits.
  - Credits for the production of vehicles for different markets should be treated the same, by partially uncapping all production credits.
  - The dependency threshold for the component suppliers should be raised to $2 million to facilitate the rationalisation of the industry. Automotive service providers and automotive machine tool producers should continue to meet the lower threshold of $500,000.
  - The loadings applying under the previous Automotive Competitiveness and Investment Scheme for supply chain investment should be abolished.
  - The list of eligible research and development (R&D) activities should be streamlined and exclude payments for recruitment and management.
  - The rate for claims for investment in eligible R&D should be increased from 45 to 50 percent.
  - The rate for claims for investment in plant and equipment should be reduced from 25 to 15 percent.
  - Firms that have not participated in a supply-chain capability development program should participate in such a scheme in return for receiving government assistance. Funding for the program should be provided by the Australian Government with contributing payments from the firms themselves. The supplier capability program should not be limited to participation in Automotive Supplier Excellence Australia, but also include other service providers such as Enterprise Connect, C21 and the motor vehicle producers' supplier capability programs.
- The passenger motor vehicles and parts thereof tariffs should be reduced from 10 to 5 percent on 1 January 2010. This, combined with assistance under the Global Automotive Transition Scheme, will help deliver benefits to the economy as well as continuing to provide transitional support for the industry.
- A dialogue between the Australian and affected state and territory governments should occur to ensure that investment incentives are not overly generous and that the benefits exceed the costs of providing such assistance.
- States and territories should consider the harmonisation and reduction of stamp duties, vehicle registration and compulsory third-party insurance to facilitate the purchase of new (or newer second-hand) vehicles to help to reduce the average age of the Australian vehicle fleet. This could be through forums such as the Council of Australian Governments or the Council for the Australian Federation.
- An Automotive Industry Innovation Council should be established, with high level representation from the motor vehicle producers, component suppliers, unions, research and academic organisations, and government.
  - The Automotive Industry Innovation Council should provide advice and oversight in relation to the new transitional arrangements applying to the industry.
  - Administrative expenses and secretariat support to the Automotive Industry Innovation Council should be funded under the Global Automotive Transition Scheme.
  - The Automotive Industry Innovation Council should include a reference group that provides advice on automotive skills issues to Manufacturing Skills Australia (the Industry Skills Council having primary carriage for manufacturing industry skills development).

APPENDIXES

APPENDIX A: AUTOMOTIVE TRADE[1, 2]

VEHICLE EXPORTS

Table A.1 shows that the value of vehicle exports was $2.9 billion in 2006–07. This is a 15.2 percent decrease on the value of vehicle exports in 2005–06. The table also shows that the value of exports of passenger motor vehicles (PMVs) had been steady at around $2.8 to $2.9 billion for the three years between 2002–03 and 2004–05. However, it grew by 14.4 percent in 2005–06 to almost $3.2 billion, before falling back in 2006–07. This was mainly due to a fall in exports to the United States. The major export market for PMVs is Saudi Arabia, which accounted for over 40 percent of the value of these exports in 2006–07. The main vehicles exported to this market were manufactured by Toyota and GM Holden (with the latter badged as a Chevrolet). The next largest export market was New Zealand (to which all three of the local producers export). PMV exports to the United States decreased dramatically in 2006–07 as a result of the cessation of the program to export the Holden Monaro to that country. However, this is expected to rebound, with a VE Commodore variant being exported to the United States as a Pontiac G8. In addition, GM Holden has announced that it will also export the VE Utility as a Pontiac 'sports truck' in the second half of 2009.

1 Department of Innovation, Industry, Science and Research, *Trade Information System* (incorporating unpublished import and export data from the ABS), DIISR, Canberra, 2008. This database incorporates data on a financial year basis.

2 For the purposes of analysis, the major automotive tariff items were analysed. There were some omissions for components that could be used for both automotive and non-automotive purposes. However, these omissions are minor. For example, for the value of exports of vehicles extracted from the ABS data there is only on average a 0.2 percent difference to the value of vehicle exports obtained from DFAT's STARS database (and which is categorised as per the Standard International Trade Classification system). For the value of exports of automotive components, there is on average a 3.2 percent difference between the two data sources.

The United Arab Emirates, Kuwait and Oman are also important export markets, between them accounting for over 27 percent of the value of PMV exports in 2006–07. The vehicles exported to these countries include Toyotas and Holdens (also badged as Chevrolets).

Table A.1 also shows that the value of exports of goods vehicles nearly tripled in the period 2002–03 to 2004–05, while the value of exports of tractors and buses fell. However, the value of exports of goods vehicles fell significantly in 2005–06 and 2006–07 to $145 million. The value of exports of buses also continued to fall in 2005–06 but recovered slightly to $6 million in 2006–07. The value of exports of tractors increased by 125 percent in 2005–06 and a further 14.4 percent in 2006–07, to over $54 million.

The value of exports of utilities (mostly to New Zealand) remained fairly constant from 2003–04 to 2006–07, when it fell 47 percent to $72 million. However, the value of exports of dumpers grew significantly in the period 2002–03 to 2004–05, but decreased by nearly 60 percent in 2005–06 to almost $40 million. This recovered to $73 million in 2006–07. In 2004–05 the value of exports of dumpers to Indonesia increased significantly, accounting for the total growth in the value of exports of dumpers in 2004–05. The decrease in the value of these exports to Indonesia in 2005–06 accounted for nearly all the decrease in the value of these vehicles in 2005–06. The increase in 2006–07 was mainly a result of new exports to South Africa, Chile and Singapore and an increase in exports to Papua New Guinea.

COMPONENT EXPORTS

Table A.2 shows that the value of exports of components has fallen by 2.1 percent to $1.8 billion since 2002–03. This decrease is mainly attributable to significant falls in the value of exports of parts used in motor vehicles (including brakes, clutches and gearboxes) and electrical switches and apparatus. This was mostly balanced by increases in the value of exports of engines and tyres. These values could fall in the future as a result of the closure of GM Holden's four-cylinder engine plant from 2009, and the closure of South Pacific Tyres' Somerton tyre factory from the end of 2008.

Parts used in motor vehicles

Table A.3 shows that the value of exports of parts used in motor vehicles (including brakes, clutches and gearboxes) has fallen by over $380 million since 2002–03. This is due to large falls in exports of brakes and servos, gearboxes, safety belts, and chassis and parts.

Brakes

The value of exports of brakes and servos has fallen by $120 million since 2002–03, to $100 million in 2006–07. This was driven by a drop of $149 million in exports to the United States. Exports to Mexico have also fallen since 2002–03.

There was a small increase in the value of exports to China between 2002–03 and 2005–06, followed by a very large increase of over 1,500 percent to $85 million in 2006–07. There was also a significant increase in exports to Thailand in 2005–06, which fell sharply to $11 million in 2006–07.

Gearboxes

The value of exports of gearboxes has fallen by $106 million since 2002–03. The fall is attributable to a drop in the value of exports to the Republic of Korea.

Electrical switches and apparatus

The value of exports of electrical switches and apparatus has decreased by over 22 percent since 2002–03 to $184 million in 2006–07. This is a result of a fall in exports to Germany (-$115 million since 2002–03). There have been some increases in exports to the United States, New Zealand and the Republic of Korea.

Engines

The value of exports of engines has increased by $307 million (or nearly 106 percent) to $596 million since 2002–03. The main market for engines is the Republic of Korea ($293 million), followed by China ($69 million), the United States ($37 million), Thailand ($36 million) and Germany ($24 million). The major Australian exporter of engines is GM Holden, which exports a four-cylinder motor to GM Daewoo in the Republic of Korea. Holden announced in June 2008 that it is ceasing production of the four-cylinder engines.

Engine sales to Sweden increased dramatically in 2005–06 – Holden's Alloytec V6 engine is now sourced by Saab for the 9-3 and 9-5 models. The increase in engine exports to Italy is a result of Holden's V6 engine, now sourced in Alfa Romeo's 159, 147, GT, Brera and Spider 3.2.

Tyres

The value of exports of tyres remained flat between 2003–04 and 2005–06, but then increased by 105 percent to over $81 million in 2006–07. This increase was largely because of increases in exports to several countries including South Africa, the United States, New Zealand, Papua New Guinea and the Netherlands.

Other parts

The value of exports of automated regulators increased from $75 million in 2002–03 to $160 million in 2004–05. This was a result of the value of exports of these components to Germany tripling to $105 million in 2004–05. However, since then, exports of automated regulators fell significantly to $58 million in 2006–07. This was almost purely a result of a decrease in exports to Germany, with only $10 million being exported there in 2006–07.

The value of exports of mirrors and reflectors has increased by $22 million since 2002–03, mainly as a result of an increase in the value of exports to the United States.

The value of exports of instruments and gauges increased by 31.6 percent in 2005–06 to $38.2 million. These exports increased a further 7.0 percent to $41 million in 2006–07. These increases were a result of an increase in the value of exports to the United Kingdom, the United States and several other countries. This was offset, to some extent, by a small decrease in exports to Djibouti, India and Belgium.

The value of exports of speed indicators and tachometers more than doubled to nearly $15 million in 2004–05. These exports stayed steady in 2005–06 before falling back 31 percent to less than $10 million

in 2006–07. The fluctuation has largely been due to changes in the level of these exports to Germany.

VEHICLE IMPORTS

The value of vehicle imports was $19.4 billion in 2006–07, as shown in Table A.4. This is more than seven times the level of Australian automotive exports for the same year. The table also shows that the value of imports of PMVs grew at an average annual rate of 6.5 percent from 2002–03 to 2006–07 to $13.2 billion. The main source country of imported vehicles was Japan, which accounted for 41 percent of the value of vehicle imports in 2006–07. The next largest source country of imported vehicles was Thailand, followed by the United States.

Japan has consistently remained the largest source country of imported vehicles. Of the $7.9 billion imported in 2006–07, $6.2 billion was PMVs and $1.4 billion was goods vehicles. The value of vehicle imports from South Africa increased significantly over the period 2002–03 to 2005–06, from $450 million to $934 million. However, this decreased by over 20 percent in 2006–07 to $742 million.

Table A.4 also shows that the value of imports of special-purpose vehicles more than tripled in the period 2002–03 to 2005–06, then remained steady at $203 million in 2006–07. The value of imports of buses increased by 48 percent over the period 2002–03 to 2005–06, and then fell 9.8 percent in 2006–07 to $165 million. Imports of goods vehicles has increased at an average annual rate of almost 16 percent – from $2.8 billion in 2002–03 to over $5 billion in 2006–07. Imports of tractors increased over the period 2002–03 to 2004–05, but then fell more than 23 percent to $770 million in 2006–07.

The value of imports of utilities (mostly from Thailand) increased at an average annual rate of 13.9 percent from 2002–03 to 2006–07. The growth in imports of utilities from Thailand accounted for over 71 percent of the total growth in utilities over the same period. The value of imports of dumpers grew even more significantly (at an average annual rate of over 25 percent) in the period 2002–03 to 2006–07, to nearly $1.1 billion. Imports of dumpers from the United States accounted for 81 percent of the total growth.

COMPONENT IMPORTS

As shown in Table A.5, the value of imports of components remained steady over the period 2002–03 to 2005–06, increasing only 1.3 percent to $6.6 billion. However, in 2006–07, the value of imports of components increased 12 percent to $7.4 billion. This significant jump is mainly attributable to increases in the value of imports of tyres, parts used in motor vehicles (including brakes, clutches and gearboxes), electrical switches and apparatus, and chassis with engines. Australia's component imports are 3.7 times greater than its component exports.

Tyres

As shown in Table A.5, the value of tyre imports increased at an average annual rate of 7 percent over the period 2002–03 to 2005–06, then increased 25 percent in 2006–07 to $1.7 billion. This significant jump is mainly attributable to increases in imports from China, the United States, Japan, Thailand, Lithuania, the Republic of Korea and Spain.

Instruments and gauges

The value of imports of instruments and gauges increased steadily – from $167 million in 2002–03 to $228 million in 2005–06. The value of these imports then fell by nearly 6 percent to $215 million in 2006–07. The rise in 2002–03 to 2005–06 was a result of increases in the value of imports from the United Kingdom, Germany, the United States and several other countries. The only significant drop in imports over this period was from Japan. The drop in value of these imports in 2006–07 was a result of decreases from the United Kingdom, the United States and Singapore.

Chassis with engines

Table A.5 shows that the value of imports of chassis with engines increased significantly in 2004–05 – by almost $53 million. This was driven by increases of $21.8 million and $22 million from Spain and Sweden respectively. However, in 2005–06 the value of imports of chassis and parts fell nearly 14 percent to $104.5 million. This was a result of decreases in the value of imports from Sweden and Spain, partially offset by an increase of $4.4 million from Germany. The value of these imports increased by 39 percent to over $145 million in 2006–07. This was a result of increases from Brazil, Germany and Spain.

Engines

The value of imports of engines was $944 million in 2006–07. This is a decrease of $184 million (or 16 percent) since 2002–03, attributable to reductions in imports from Canada (fall of $146 million), the United States ($133 million) and Japan ($101 million). The decreases were partly offset by increases from Mexico (rise of $94 million) and Thailand ($60 million).

The major source markets for engines in 2006–07 were the United States ($332 million), Japan ($151 million), Mexico ($112 million), Thailand ($75 million), Germany ($58 million) and Canada ($38 million).

Parts used in motor vehicles

The value of imports of parts used in motor vehicles (including brakes, clutches and gearboxes) was $2.36 billion in 2006–07. This is an increase of $146 million since 2002–03, as shown in Table A.6. This is due to increases in the value of imports of drive axles, road wheels, safety belts, radiators, bumpers, suspension shock-absorbers and steering wheels. The increases were partially offset by a significant reduction in the value of imports of gearboxes (drop of $140 million).

Drive axles (with differentials)

The value of imports of drive axles increased gradually from 2002–03 to 2005–06 – from $10 million to $16 million. The following year, 2006–07, saw a dramatic increase of over 480 percent to $95 million. This was mainly as a result of an increase of almost $66 million from Japan in 2006–07 – from only $1 million in 2005–06.

Road wheels

The value of imports of road wheels was just under $214 million in 2006–07, as shown in Table A.6. This is an increase of $66 million since 2002–03. Imports from China accounts for 75 percent of the growth.

Safety belts

The value of imports of safety belts remained steady over the period 2002–03 to 2005–06. In 2006–07, imports increased 24 percent to $316 million. The increase was mainly due to increases in imports from Thailand, China, South Africa and Japan.

Gearboxes

The value of imports of gearboxes was $424 million in 2006–07, as shown in Table A.6. This is a fall of $140 million since 2002–03. The drop in the value of imports from Japan and the United States more than accounts for all of this reduction, which was partially offset by increases from Germany and France.

Other parts

The value of imports of safety and other glass has increased steadily. Between 2002–03 and 2006–07, imports rose at an average annual rate of 8.8 percent to $128 million. China accounted for 85 percent of this increase.

Between 2002–03 and 2004–05, the value of imports of automated regulators increased at an average annual rate of 5 percent to reach $566 million. However, the value of these imports has fallen at an average annual rate of 2.9 percent since then – to $534 million in 2006–07. This was a result of the value of imports from Germany increasing by 44 percent between 2002–03 and 2004–05. Imports from Germany then fell by 18.7 percent (to $107 million) in the two years to 2006–07. Imports of automated regulators from the United States increased by nearly 18 percent in 2003–04, but have since fallen nearly 25 percent to $143 million.

The value of imports of vehicle bodies increased at an average annual rate of nearly 19 percent since 2002–03—to $48 million in 2006–07. This is attributable to increases in the value of imports from Mexico, Chile, the United States, Brazil, Italy and Japan. The increases were partially offset by decreases in imports from France, Sweden and South Africa.

Over the period 2002–03 to 2005–06, the value of imports of electrical switches and apparatus fell at an average annual rate of 1.1 percent to $633 million. These imports then increased 14.4 percent in 2006–07 to $724 million. This was a result of rises in the value of imports from China, Malaysia, the United States, Japan, the Netherlands and several other countries.

Between 2002–03 and 2005–06, the value of imports of lamps decreased at an average annual rate of 3.2 percent to $171 million. These imports then increased 16.6 percent in 2006–07 to $200 million. The growth is attributable to a rise in the value of imports from China.

The value of imports of friction material for brakes and clutches was steady between 2002–03 and 2004–05, but decreased 29 percent to $22 million in 2006–07. This represents a decrease of nearly $11 million since 2002–03. The drop is attributable to a fall in the value of imports from Japan.

Between 2002–03 and 2004–05, the value of imports of parts used in seats increased at an average annual rate of 4.8 percent. During this period, there was a shift in source countries for these imports, with large decreases from Japan and Thailand, and a large increase from South Africa. However, imports of parts used in seats has fallen by 12 percent since 2004–05 to $73 million in 2006–07. Since 2004–05, imports from South Africa fell by $34 million while imports from Thailand increased by $32 million.

Table A.1. Australia's motor vehicle exports ($'000), 2002–03 to 2006–07

Description	2002–03	2003–04	2004–05	2005–06	2006–07
Tractors	45,161	6,757	21,039	47,270	54,068
Buses	25,145	12,572	12,136	4,879	6,056
PMVs	2,796,629	2,927,265	2,790,473	3,192,872	2,691,533
Goods vehicles	75,546	160,528	221,518	175,717	145,789
Special purpose vehicles	22,311	25,410	27,282	30,121	27,891
Total	**2,964,793**	**3,132,533**	**3,072,448**	**3,450,858**	**2,925,336**

Table A.2. Australia's component exports ($'000), 2002–03 to 2006–07

Description	2002–03	2003–04	2004–05	2005–06	2006–07
Rubber tubes and pipes	17,078	17,176	19,455	18,250	20,808
Tyres	29,183	38,321	39,319	39,762	81,592
Retreaded tyres	8,202	8,501	10,046	13,558	14,615
Friction material for brakes and clutches	2,820	3,408	4,412	5,142	4,573
Safety and other glass	23,456	18,238	18,786	17,951	20,531
Mirrors and reflectors	57,235	45,961	78,603	78,613	79,684
Engines	289,036	438,151	456,542	653,083	596,362
Electrical switches and apparatus	236,848	120,208	108,163	128,310	184,737
Lamps	12,420	10,946	11,086	9,745	12,676
Chassis with engines	992	3,074	6,009	6,045	4,946
Bodies	9,057	5,459	4,410	6,058	8,380
Parts used in motor vehicles (including brakes, clutches and gearboxes)	1,041,575	883,562	715,228	659,796	660,885
Instruments and gauges	29,691	30,557	29,033	38,218	40,885
Speed indicators and tachometers	5,574	6,248	14,744	14,258	9,754
Automated regulators	75,071	133,792	159,854	115,587	58,140
Seats	3,927	3,243	3,371	4,147	4,406
Total	**1,842,165**	**1,766,846**	**1,679,062**	**1,808,523**	**1,802,973**

Table A.3. Selected Australian component exports ($'000), 2002–03 to 2006–07

Description	2002–03	2003–04	2004–05	2005–06	2006–07
Bumpers	7,296	6,903	7,507	11,797	16,230
Safety belts	152,776	129,681	126,014	74,342	52,445
Brakes and servos	220,151	206,002	140,770	98,105	100,173
Gearboxes	202,863	142,976	47,580	56,483	96,691
Drive axles (with differentials)	25,273	25,764	34,293	26,181	30,820
Non-drive axles	1,547	1,490	4,645	1,996	587
Road wheels	26,287	25,808	22,410	25,222	23,202
Suspension shock absorbers	29,320	34,301	31,062	22,311	27,240
Radiators	5,961	5,177	6,098	10,186	15,031
Exhaust pipes	6,731	8,909	5,704	4,983	4,193
Clutches	15,409	9,506	8,001	5,338	5,105
Steering wheels	3,117	2,600	2,988	2,966	5,328
Airbags*	n/a	n/a	n/a	n/a	1,110
Chassis and parts	344,844	284,446	278,156	319,885	282,729
Total	**1,041,575**	**883,562**	**715,228**	**659,796**	**660,885**

Note: This table is a subset of 'Parts used in motor vehicles (including brakes, clutches, gearboxes and so on)' in Table A.2.

* This is a new classification formed under the HS 2007 classification.

Table A.4. Motor vehicle imports into Australia ($'000), 2002–03 to 2006–07

Description	2002–03	2003–04	2004–05	2005–06	2006–07
Tractors	800,017	896,418	1,001,929	898,829	770,211
Buses	123,903	129,546	150,996	183,348	165,410
PMVs	10,261,819	11,013,676	11,649,996	12,003,438	13,195,360
Goods vehicles	2,809,352	3,046,010	3,860,481	4,148,291	5,072,984
Special purpose vehicles	60,252	83,564	155,180	204,694	203,393
Total	**14,055,343**	**15,169,215**	**16,818,582**	**17,438,600**	**19,407,358**

Table A.5. Component imports into Australia ($'000), 2002–03 to 2006–07

Description	2002–03	2003–04	2004–05	2005–06	2006–07
Rubber tubes and pipes	133,770	119,202	135,543	134,237	154,124
Tyres	1,114,387	1,102,630	1,243,323	1,365,466	1,710,084
Retreaded tyres	27,005	25,162	26,291	38,558	43,227
Friction material for brakes and clutches	33,036	33,753	31,309	20,308	22,234
Safety and other glass	91,251	104,304	109,978	119,224	127,669
Mirrors and reflectors	46,420	43,287	44,934	42,446	44,688
Engines	1,126,742	1,068,020	996,691	941,255	943,048
Electrical switches and apparatus	654,433	616,183	642,458	633,008	723,978
Lamps	188,968	172,159	169,015	171,180	199,594
Chassis with engines	68,664	68,382	121,259	104,486	145,540
Bodies	24,254	27,846	32,257	45,746	48,035
Parts used in motor vehicles (including brakes, clutches and gearboxes)	2,215,304	2,014,947	2,133,933	2,110,423	2,361,124
Instruments and gauges	166,738	186,030	206,251	228,269	215,072
Speed indicators and tachometers	33,220	33,046	36,526	31,676	39,255
Automated regulators	513,801	540,712	566,482	540,086	534,351
Seats	14,645	13,371	15,131	14,825	16,068
Parts used in seats	75,345	77,850	82,827	68,580	72,849
Total	**6,527,984**	**6,246,886**	**6,594,207**	**6,609,772**	**7,400,937**

Table A.6. Selected component imports into Australia ($'000), 2002–03 to 2006–07

Description	2002–03	2003–04	2004–05	2005–06	2006–07
Bumpers	31,939	33,566	35,825	39,830	48,588
Safety belts	256,384	237,867	252,359	255,325	315,653
Brakes and servos	175,354	160,649	188,005	186,464	188,315
Gearboxes	564,495	471,758	474,717	441,567	424,073
Drive axles (with differentials)	9,921	11,889	14,892	16,340	95,055
Non-drive axles	16,296	20,485	26,233	26,708	9,214
Road wheels	147,474	154,868	196,023	196,054	213,536
Suspension shock absorbers	52,723	48,992	48,022	47,493	69,127
Radiators	32,216	30,702	35,536	35,833	62,468
Exhaust pipes	29,699	30,788	30,989	35,377	32,100
Clutches	63,820	59,969	61,410	57,477	54,690
Steering wheels	44,158	43,520	48,287	45,034	60,202
Airbags*	n/a	n/a	n/a	n/a	8,838
Chassis and parts	790,825	709,893	721,634	726,921	779,264
Total	**2,215,304**	**2,014,947**	**2,133,933**	**2,110,423**	**2,361,124**

Note: This table is a subset of 'Parts used in motor vehicles (including brakes, clutches, gearboxes and so on)' in Table A.5 above.

*This is a new classification formed under the HS 2007 classification.

APPENDIX B:
AUTOMOTIVE COMPETITIVENESS AND INVESTMENT SCHEME ELIGIBILITY CRITERIA

Table B.1. ACIS eligibility thresholds

Measure	Description
Minimum volume or dependency	An automotive component producer must supply at least 30,000 components, or the components produced by the firm in Australia must be worth at least $500,000 and comprise at least 50 percent of all the firm's production of components. Automotive machine tooling producers have value and dependency requirements.
National interest registration	A firm that fails the minimum volume requirement may seek registration in the national interest because of other key factors.
Original equipment (OE)	Defines OE as components fitted to the vehicle during assembly or certain types for post-assembly fitment.
One kind of automotive component [s. 17(1)(a)]	Volume requirement applying to 'one kind of automotive component'.
Contrivances	Enables the Secretary to refuse registration or to deregister if the purpose of the Act is not being furthered.
Production definition	Defines production as including the putting together of parts.
Parts for Australian vehicles	The requirement is that the participant produce parts in Australia.

Table B.2. ACIS rates of assistance

Measure	Description
Uncapped production	Credits paid at 15% times the tariff rate, multiplied by the production value of eligible vehicles sold domestically or to New Zealand.
Capped production	Credits paid at 10% times the tariff rate times production value for domestic and NZ sales. Paid at 25% times production value times the tariff rate for other destinations.
R&D	Credits paid at 45% of eligible R&D investment.
Plant and equipment	Credits paid at 10% of eligible plant and equipment (MVPs) or 25% (MVP component use and supply chain).
Contracted R&D	MVPs may claim ACIS for R&D work they are contracted to perform. The supply chain may not claim contracted R&D.
5% cap	Limits assistance to no more than 5% of previous year's sales.

Table B.3. ACIS – activity limitations

Measure	Description
Offshore R&D	Participants can claim the lesser of costs of own offshore research and 20% of the Australian based research.
Contracted R&D	Participants other than MVPs cannot claim for work for which they are contracted to perform.
Outsourced R&D	Participants may subcontract R&D to cooperative research centres or to other parties.
Eligible R&D	Defines what is and what is not eligible R&D.
Allowed expenses	See Table B.4.
20% loading	Encompasses other costs not listed in the regulations.

Table B.4. ACIS – allowed expenses

Measure	Description
Meaning of costs in R&D	Salary or wages.
	Allowances, bonuses, overtime and penalty rate payments.
	Leave payments for annual leave, sick leave and long service leave.
	Superannuation fund contributions, payroll tax and workers compensation insurance premiums.
	The cost of providing any vehicle or other benefits included in the employee's remuneration package.
	Costs of graduate development programs.
	Costs of training to use software specifically related to the R&D.
	Labour costs in respect of employees managing, directly supporting or assisting, or directly involved in, the recruitment, training and development, of the employee.

APPENDIX C: SUPPORT FOR THE AUTOMOTIVE INDUSTRY IN SELECTED ECONOMIES

INTRODUCTION

This appendix outlines the arrangements offered by several economies to support their automotive industries. These arrangements are in addition to tariffs and include specific automotive policies and investment incentives.

NATIONAL AUTOMOTIVE POLICIES

Most major automotive-producing countries complement their tariff regimes with policies to protect and foster the development of a domestic automotive industry. In many instances, these policies are accompanied by specific investment incentives to attract automotive firms to establish operations in a country or countries. Most of these policies generally provide supply-side subsidies, the exception being France. In addition, in the more mature economies such as Germany, the subsidies are targeted at R&D. For many of the emerging economies, the subsidies are targeted at production (for example, Thailand).

Thailand

The automotive sector is one of Thailand's five designated growth industries (the others are agribusiness, electronics, fashion and high value-added services). Thailand appears to be on track to achieve its objective of becoming the 'Detroit of Asia', and producing 1.8 million vehicles per annum by the end of the decade.

Thailand's Board of Investment attracts investment from international automotive companies through generous incentives and minimal restrictions. Incentives include income tax holidays for up to eight years, guarantees, support services and reduction of, or exemption from, import duties on machinery and raw materials. Automotive investment projects valued at 10 billion baht (approximately $330 million) and related parts production attract a permanent exemption of import tax on machinery. There are no restrictions or requirements on foreign ownership, export or local content. Foreign firms are allowed to own land and, with few exceptions, to locate where they wish.[1]

More recently, Thailand has introduced incentives to encourage automakers to set up local production bases for 'eco-cars' that meet the most stringent European emissions standards. Eco-cars are defined as either petrol-fuelled vehicles with an engine size of no more than 1,300 cubic centimetres (cc), or diesel-fuelled vehicles with engines up to 1,400 cc. They must not consume more than one litre of fuel per 20 kilometres and must emit no more than 120 grams of CO_2 per kilometre.[2] Under the scheme, companies that produce eco-cars will not have to pay corporate income taxes on their investments for eight years, and duties on imported machinery will be waived.[3]

Most of the proposals are designed to produce cars for export. Seven automakers, including Toyota, Volkswagen, and India's Tata have proposed eco-car projects to Thailand's Board of Investment. Each

1 Board of Investment (Thailand), *A Guide to the Board of Investment, Section 4.23 Automobile Manufacturing*, viewed at http://www.boi.go.th/english/about/section4.pdf.

2 Ekvitthayavechnukul, C, 'Eco Car Approvals: International firms apply to build new plants', *The Nation*, 8 December 2007, viewed at http://www.nationmultimedia.com/2007...s_30058542.php.

3 Board of Investment (Thailand), *BoI to Promote Eco-Cars Maximum Incentives for Integrated Car Assembly and Key Parts Manufacturing Projects*, BoI Press Release, No. 87/2 / 2007 (0.41/2), 15 June 2007.

automaker is required to invest at least 5 billion baht to earn the Board's tax incentives. As at June 2008, six eco-car projects have received Board of Investment privileges, including Honda, Nissan and Suzuki. Combined production of these cars is estimated at 800,000 units in the next six to seven years, which would make Thailand an important production base for energy-efficient passenger cars.[4]

Toyota has announced plans to make a broad range of alternate-fuel vehicles and fuels in Thailand, including a US$175 million addition to the diesel engine line at its Chonburi plant. The Japan Auto Digest also reported that the "company said it also plans to make the Camry Hybrid, and CNG [compressed natural gas] and E85 ethanol-capable vehicles over the next several years, and local reports said it is involved in experiments with a promising new oil from an inedible plant for use as biodiesel fuel".[5]

As part of its drive to establish Thailand as a hub for the production of alternative energy or fuel efficient vehicles, the Thai Government is also providing incentives to encourage more motorists to switch to using E85, a blend of 85 percent ethanol and 15 percent petrol. To this end, the government has exempted import tariffs on E85 car parts as well as reducing excise taxes for E85-powered vehicles. However, further incentives will probably be offered, given that 14 car manufacturers in Thailand have delivered their assessment that the government's measures and incentives are still not attractive enough to induce manufacturers to produce E85 vehicles in Thailand.[6]

Malaysia

The Malaysian automotive industry is one of the most protected in the region. It released its National Automotive Policy Framework in October 2005. The framework contains five objectives for the domestic automotive industry: a competitive and viable automotive sector (particularly for 'national car' makers); to become a regional hub; to enhance value-added and local capabilities; to promote an export-oriented industry; and Bumiputera (ethnic Malay) participation (including equity levels).[7]

The framework contains a range of measures to assist the development of the industry, including:

- an Industrial Adjustment Fund of interest-free loans and matching grants to assist manufacturers in facing greater competition and liberalisation (a key measure to replace the previous excise rebate for 'national car' producers – the previous excise regime allowed purchasers of locally produced cars such as the Proton and Perodua to receive a 50 percent rebate on vehicle excise tax);
- incentives to parts manufacturers through bilateral free trade agreement cooperation projects and a Global Supply Program;
- training, R&D and technology acquisition grants;
- market development grants to help small and medium-sized enterprises develop export markets;
- ensuring compliance with international safety and environmental standards; and
- tax and non-tax incentives 'customised' for specific investors and for five designated production centres – Gurun (Kedah), Bertam and Seberang Prai (Pulau Pinang), Pekan (Pahang), Tanjung Malim (Perak), and Shah Alam and Rawang (Selangor).

Most incentives are available to both national and non-national car and parts makers to encourage continued investment in the sector. However, the 'national car' producers receive the bulk of assistance.

Only holders of an Approved Permit (AP) may import motor vehicles, which limits them to a small share of the total market and effectively acts as an import quota. There are 76 holders of open APs and 37 franchise AP holders. The Malaysian Ministry of International Trade and Industry gives APs based on quota, but does not publish names of approved persons/companies or volumes. Generally, import license approvals for commercial vehicles are not given. The October 2005 National Automotive Policy Framework announced that APs for completely built-up cars will be phased out in the longer term, with some minor interim changes, but did not provide a timeline.[8]

Philippines

Motor vehicle and component manufacturing assembly is open to foreign companies. The Motor

4 MCOT, *Govt's incentives insufficient for E85 cars made in Thailand*, 2008, viewed at http://enews.mcot.net/view.php?id=4618.

5 Fillmore, K, 'Toyota Thailand Invests in Diesels, Hybrids, CNG, E85 Vehicles, Biodiesel Experiments', *Japan Automotive Digest*, 16 June 2008, p. 3.

6 *Govt's incentives insufficient for E85 cars made in Thailand*, op. cit.

7 Jabatan Perdana Menteri (Prime Minister's Department), *The National Automotive Policy*, 19 October 2005, viewed at http://www.maa.org.my/pdf/National%20Automotive%20Policy%20Framework.pdf.

8 ibid.

Vehicle Development Program prohibits the importation of used vehicles and provides special incentives for the export of vehicles and components. Automotive parts manufacturing is listed as an investment priority area and incentives are available under the Omnibus Investments Code.[9]

Export-oriented companies registered with investment agencies such as the Philippines Board of Investment, Philippine Economic Zone Authority, Clark Development Corporation and Subic Bay Metropolitan Authority are entitled to incentive packages. For example, the Board of Investment is empowered to grant an income tax holiday of up to eight years. The latter three agencies can grant special tax rates of 5 percent on adjusted gross income, plus duty exemptions on the importation of all capital equipment and raw materials.

Assemblers and manufacturers who do not operate a customs-bonded manufacturing warehouse and/or whose facilities are not located inside export zones are refunded duties paid on raw materials used in the manufacture or production of articles upon exportation of the same through a tax credit system.

In 2005, the Philippines exported cars in quantity for the first time. This was due to Ford, which invested US$250 million in a vehicle assembly plant courtesy of investment incentives.[10]

China

The Chinese Government's automotive industry policy aims to prioritise the development of its own automotive industry over the further opening of its markets to imports. The policy aims to have Chinese-owned vehicle manufacturers supply 50 percent of the domestic market and have Chinese vehicle and component manufacturers and assemblers own all the IP relating to their products.[11] The key elements of the plan are to:

- rationalise the number of automotive producers;
- achieve 40 percent export of total component sales;
- restrict foreign car companies to two joint ventures per company; and
- retain the 50 percent limit on foreign holdings in a joint venture.

As part of its automotive policy, China introduced the *Measures on the Importation of Parts for Entire Automobiles*. The United States and the European Union have argued that these rules impose charges that unfairly discriminate against imported automotive parts, and discourage automobile manufacturers in China from using imported automotive parts in the assembly of vehicles. As noted by the US Trade Representative:

> *…the rules require all vehicle manufacturers in China that use imported parts to register with China's Customs Administration and provide specific information about each vehicle they assemble, including a list of the imported and domestic parts to be used, and the value and supplier of each part. If the number or value of imported parts in an assembled vehicle exceeds specified thresholds, the regulations imposed on each of the imported parts a charge equal to the tariff on complete automobiles (typically 25 percent) rather than the tariff applicable to automotive parts (typically 10 percent).*[12]

Several economies, including the United States, the European Union and Canada, have raised the issue in the World Trade Organization.

India

The Indian Government sees the automotive sector as a 'sunrise sector' and, in January 2007, launched its Automotive Mission Plan. The plan, which is a joint document prepared by industry and the government, aims to make the automotive sector a US$145 billion industry, and create additional employment for 25 million people by 2016. It also envisages additional investment of about US$40 billion.

The plan encompasses proactive action in attracting investment, affirmative action with regard to expansion of infrastructure, and development of human resources.[13]

Many firms, including Tata, Maruti, Suzuki, Toyota, Honda and Nissan have established and/or are expanding their automotive manufacturing plants in India.

India's 2008–09 budget contained excise duty reductions from 24 to 14 percent for hybrid cars and full excise exemptions for electric cars. The reduction in the excise duty for hybrid cars may benefit Tata and

9 US Trade Representative, *National Trade Estimate Report on Foreign Trade Barriers*, USTR, Arlington, 2008.

10 The Auto Channel, 'Philippines to Become Ford's ASEAN Export Hub', *The Auto Channel*, 14 October 2003, viewed at http://www.theautochannel.com/news/2003/10/14/170568.html.

11 Deloitte, *Future Drivers of the China Automotive Industry*, Deloitte, 2006.

12 US Trade Representative, *National Trade Estimate Report on Foreign Trade Barriers*, USTR, Arlington, 2008.

13 Ministry of Heavy Industries & Public Enterprises, *Draft Automotive Mission Plan 2006–2016*, September 2006.

Mahindra and Mahindra, which are planning to launch hybrid vehicles, as well as Honda, which is planning to launch the hybrid Civic into the Indian market.[14]

South Africa

In South Africa, the Motor Industry Development Program was designed to help the industry adjust and increase its competitiveness in the new post-apartheid trade policy environment. The program has five main elements:

- a gradual reduction in import duties on both vehicles and components;
- an export–import complementation scheme under which vehicle and components exporters can earn tradeable 'Import Rebate Credit Certificates' to offset duties on imported vehicles and components;
- access to the standard duty drawback program for exporters, under which all import duties paid on components and intermediate inputs used in exported vehicles and components can be rebated;
- a duty-free allowance on imported components on around one-quarter of the value of vehicles produced for the domestic market; and
- a Productive Asset Allowance that provides import duty credits of around one-fifth of the value of qualifying investments.

The incentives in respect of components apply only to those sold directly to original equipment manufacturers. This excludes from the program after-market components, a sector in which South Africa might have some regional, and maybe even global, comparative advantage.[15]

The program has been reviewed and extended twice. It now is scheduled to continue until 2012, subject to a review that is still to be completed.

The automotive industry also benefits from a wide variety of other initiatives by national, provincial and local governments. These range from restrictions on imports of used cars to the provision of infrastructure, factory facilities and special financial arrangements. Firms that have established operations in South Africa include BMW, DaimlerChrysler, Delta, Ford, Nissan, Toyota and Volkswagen.

14 Arun, LP, ANALYSIS: India's Budget 2008–2009, Frost & Sullivan, 14 May 2008, viewed at http://www.just-auto.com/article.aspx?ID=94799&lk+dm.

15 *SouthAfrica.info*, 'SA auto industry rides MIDP wave', *SouthAfrica.info*, 8 October 2003, http://www.southafrica.info/doing_business/investment/oppurtunities/midp.htm.

United States

State governments in the United States, particularly in the south, have been active in offering investment incentives to automotive makers. Incentives include property tax abatements, lower electricity rates, extension of infrastructure, payments toward worker training programs, job creation tax credits (up to US$1,000 per new position) and pre-employment job training programs. Recent examples include:

- Kia announced that it would build its first American plant in West Point, Georgia, at a cost of US$1.2 billion. The plant, which is to open later in 2008, will employ 2,500 workers. It will be capable of producing 300,000 cars a year by 2009. To facilitate this, Kia is receiving US$410 million in state and local tax credits and other assistance (such as land for the plant and the construction of a training facility), which translates into about US$160,000 for each job at the plant;[16]
- Toyota invested US$230 million in Subaru's Indiana plant to produce 100,000 cars a year starting in 2007. Toyota received US$14 million in incentives to invest in the plant's expansion;[17]
- Toyota received an assistance package of US$358.5 million (US$293.9 million from the Mississippi government and US$64.6 million from the local Blue Spring government) to build a US$1.3 billion plant that will manufacture 150,000 Highlanders by 2010;[18] and
- The US Department of Energy is providing $30 million over three years for plug-in vehicle projects. The funding will support the assembly of 80 plug-in vehicles for fleet testing by Chrysler; the enhancement of lithium-ion battery packs and charging systems, and the deployment of plug-in vehicle test fleets by GM (which also received support from state agencies); and Ford will work with Southern CA Edison and Johnson Controls–Saft to accelerate mass production of plug-in hybrids.[19]

16 Bernstein, M, 'Kia's New Plant', *Business Week*, 25 October 2006.

17 Rowley, I, 'Toyota Breathes New Life into Subaru', *Business Week*, 29 November 2006.

18 Healey, J, 'Toyota to build Mississippi plant', *USA Today*, 27 February 2007, viewed at http://www.usatoday.com/money/autos/2007-02-27-toyota-plant_x.htm.

19 Johnson Controls, *Johnson Controls–Saft Named as Battery Supplier for Ford Test Fleet of Plug-In Hybrid Electric Vehicles*, media release, Johnson Controls Inc., Milwaukee, June 10 2008, viewed at http://www.johnsoncontrols.com/publish/us/en/news.html.

Mexico

Mexico has two main programs to stimulate manufacturing – Maquiladora and the Program for Temporary Imports to Produce Exports, or PITEX – that largely operate in the same manner. The former is focused on companies that specialise in in-bond manufacturing and export, while the latter is for companies that may have significant domestic sales. Both programs exempt companies from import duties and applicable taxes (for example, value-added tax) on inputs and components incorporated into exported manufactured goods. In addition, capital goods and the machinery used in the production process are exempt from import duties.[20]

Mexico has applied Sectoral Promotion Programs to these initiatives. Under these programs, import duties on listed inputs and components used to produce specific products are eliminated, or reduced to a competitive level. Currently there are 22 such programs available to manufacturers, including motor vehicle and component producers.[21]

In addition to the Maquiladora and PITEX programs, Mexico approved the operation of more traditional free trade zones. The new regime allows for manufacturing, repair, distribution and sale of merchandise. There are currently two approved free trade zones, both operating in San Luis Potosi.[22]

Mexico's other incentives to the manufacturing sector are offered at the state level and therefore the specific industry sectors they promote vary depending on the interests of each state. Across its 31 states, these incentives can be as diverse as project subsidies or other financial assistance, R&D tax exemptions, payroll tax exemptions, supplier development programs, employee housing and state-paid worker training. Furthermore, these incentives may be subject to negotiation depending on the industry and the size of the investment.

Brazil

Brazil has recently introduced specific tax reductions and/or incentives aimed at stimulating investments in specific sectors of the economy, including automotive industries.

Incentive packages offered to automotive makers include the following:

- Volkswagen received about US$14 million in financial incentives for dedicated infrastructure and fiscal incentives worth between US$83 million and US$155 million;
- Renault received a capital contribution of up to US$300 million, interest-free loans, local tax exemptions, donation of a 2.5 million square metre site, provision of all the necessary infrastructure and utilities at the site, and a 25 percent price reduction for electricity for the project;
- Mercedes-Benz received land, grants, tax breaks and extensive infrastructure development, including the construction of access roads and rail links to the plant and the development of utilities and sanitation (with lower water costs for 10 years); and
- GM received a waiver of state sales tax for 15 years, financial incentives of around US$67 million to prepare the factory site, and a 254 million reais (US$118 million) loan at a 6 percent interest rate.

Brazil also has incentives aimed at promoting the production of motor vehicles to run on ethanol-blended fuel.[23]

Slovakia

Slovakia attracts automotive investments through a mix of a low-cost (but skilled) labour force and taxation and relocation incentives. Slovakia is also a member of the European Union and is centrally located within a day's shipping time of major markets. Since 2004, the incentives and low labour costs have helped the country attract a US$1.25 billion assembly plant from Hyundai–Kia, a US$540 million transmission plant from Ford and a US$945 million plant from Peugeot Citroen. Volkswagen has recently expanded its plant that manufactures Touareg sports utility vehicles, of which 80 percent are exported to the United States.[24]

Russia

The Russian central and regional governments offer a number of incentives to attract investment in their automotive industry. These include regional incentives for establishing automotive production plants, and the

20 Rioz, V, Valles, J, & Martinez, L, *Manufacturing in Mexico: A Platform for Exports*, n.d, viewed at http://www.maquilaportal.com/editorial/editorial132.htm.

21 ibid.

22 *Mexico's first Free Trade Zone – may help Mexico*, n/a, n.d., viewed at http://www.mexicolaw.com/Free%20Trade%20Zone%20in%20Mexico.htm.

23 Benson, T, 'More Brazilian Drivers Turn to Ethanol', *The New York Times*, 20 October 2004.

24 Ernst & Young, *The Central and Eastern European Automotive Market: Industry Overview*, E&Y, November 2007.

construction of a components manufacturing cluster in St Petersburg.

For example, in Kaluga, local authorities provided infrastructure and tax incentives to attract a Volkswagen assembly plant that is to begin production in 2008. Volkswagen's investment in the plant is €370 million (US$450 million), and the plant will have the capacity to produce about 115,000 Passat and Touareg models a year.[25]

France

On 29 November 2006, the French Prime Minister announced additional government aid for R&D expenditure by the automotive supplier sector over the period 2006–08. The Agence pour l'innovation industrielle will release €120 million next year, over and above the sum of grant aid budgeted this year. The French Government also raised the threshold for tax credits on R&D expenditure by 100 percent to €16 million, and set aside €150 million for assistance to employees of automotive supplier companies undergoing restructuring. The sector currently employs around 20,000 people.

The French Government has agreed to far-reaching tax incentives for both fuel and flexible-fuel vehicles, including:

- no mineral oil tax on ethanol, no company car tax for the first two years, reduced registration tax and no value-added tax on fuel for the fleet customer;
- the installation of up to 500 E85 pumps by the end of 2007 (installation of 186 is nearly complete, and 50 are waiting for approval) and 1,500 by the end of 2008; and
- the commitment of the French administration to purchase 30 percent flexible-fuel vehicles within its overall 2008 vehicle purchases (the figure was 15 percent in 2007).[26]

Germany

In 2006, the Federal Government of Germany launched a National Hydrogen and Fuel Cell Technology Innovation Programme and is providing funding totalling €500 million for the next 10 years. Together with funds provided by the industry, this will be a long-term program with funding totalling €1 billion. The objective is to significantly step up applied research and, in particular, development activities in the field of hydrogen and fuel cells.[27]

There are also many incentive programs for investors in Germany, offered by European Union, federal and state authorities.

Japan

Although Japan imposes zero tariffs on the importation of automotive goods, the US Trade Representative states that a variety of non-tariff barriers have traditionally impeded access to the Japanese market.[28]

The industry benefits from the strong links that have developed between industry, government and public research institutions. The Japanese Government strongly supports R&D investment in the latest automotive technologies, including battery development and powertrain applications for fuel-efficient, low-emissions vehicles. For instance, Japan's Ministry of Economy, Trade and Industry will spend US$1.72 billion over five years for next-generation power trains and fuels to cut petrol consumption and reduce carbon dioxide emissions. More than 75 percent of the funding will focus on hydrogen fuel-cell technology.[29]

25 Emelyanova, E, 'Russian Detroit Being Built in Kaluga', *Kommersant*, 30 October 2006, viewed at http://www.kommersant.com/p717463/.

26 Blanco, S, 'Ford's European flex-fuel sales jump up 60 percent', *Autobloggreen*, 8 February 2008, viewed at http://www.autobloggreen.com/2008/02/08/fords-european-flex-fuel-sales-jump-up-60-percent/.

27 Federal Ministry of Economics and Technology (Germany), *National Hydrogen and Fuel Cell Technology Innovation Programme*, FMET, n.p., 2006, p. 6, viewed at http://www.iphe.net/Germany/H2FC%20Strategy%20englV%208May2006.pdf.

28 US Trade Representative, *National Trade Estimate Report on Foreign Trade Barriers*, USTR, Arlington, 2008, p. 310.

29 Green Car Congress, *Japan Plans to Spend $1.72 Billion Over 5 Years to Spur Development of Low-Carbon Powertrains and Fuels*, Green Car Congress, n.p., 28 May 2007, viewed at http://www.greencarcongress.com/2007/05/japan_plans_to_.html.

APPENDIX D: DETAILED R&D ANALYSIS

INTRODUCTION

R&D is central to improving the competitiveness and sustainability of Australia's automotive industry. This role is even more important given that the Australian industry cannot compete with the wage costs in emerging countries such as China and Thailand. R&D allows the automotive industry to maintain a competitive edge, by driving down costs and increasing the uptake of improved technologies and processes.

R&D DEFINITIONS

R&D can be defined in several different ways. It should be noted, however, that the Australian Bureau of Statistics' definition of 'business expenditure on R&D' (or BERD) (as defined by the OECD Frascati Manual)[1] is not as broad as the Australian Competitiveness and Investment Scheme (ACIS) definition laid out in the *ACIS Administrative Regulations 2000*. The figures quoted below follow the BERD classification of R&D. Four types of activity applicable to R&D are recognised under BERD[2]:

1. **Pure basic research** is experimental and theoretical work undertaken to acquire new knowledge without looking for long-term benefits other than the advancement of knowledge.
2. **Strategic basic research** is experimental and theoretical work undertaken to acquire new knowledge directed into specified broad areas in the expectation of practical discoveries. It provides the broad base of knowledge necessary for the solution of recognised practical problems.
3. **Applied research** is original work undertaken primarily to acquire new knowledge with a specific application in view. It is undertaken either to determine possible uses for the findings of basic research or to determine new ways of achieving some specific and predetermined objectives.
4. **Experimental development** is systematic work, using existing knowledge gained from research or practical experience, which is directed to producing new materials, products, devices, policies, behaviours or outlooks; to installing new processes, systems and services; or to improving substantially those already produced or installed.

BUSINESS EXPENDITURE ON R&D IN THE AUTOMOTIVE SECTOR

BERD by the Australian motor vehicle and part manufacturing sector grew by an annual average 7.48 percent over the last decade to reach $654 million in 2005–06.[3] Figure D.1 shows that following the introduction of ACIS in January 2001, the level of BERD in the automotive sector increased by 28.5 percent between 2000–01 and 2001–02 (to $490.2 million) and by 26.2 percent between 2001–02 and 2002–03 (to $618.7 million). Figure D.1 also shows that, while there has been strong growth in BERD since 1998–99 in motor vehicle body manufacturing (an increase of 626 percent), this has

1 OECD, *Frascati Manual, Proposed Standard Practice for Surveys of Research and Experimental Development*, OECD, Paris, 2002.

2 Australian Bureau of Statistics, *Australian and New Zealand Standard Research Classification (ANZSRC)*, cat. no. 1297.0, ABS, Canberra, 2008.

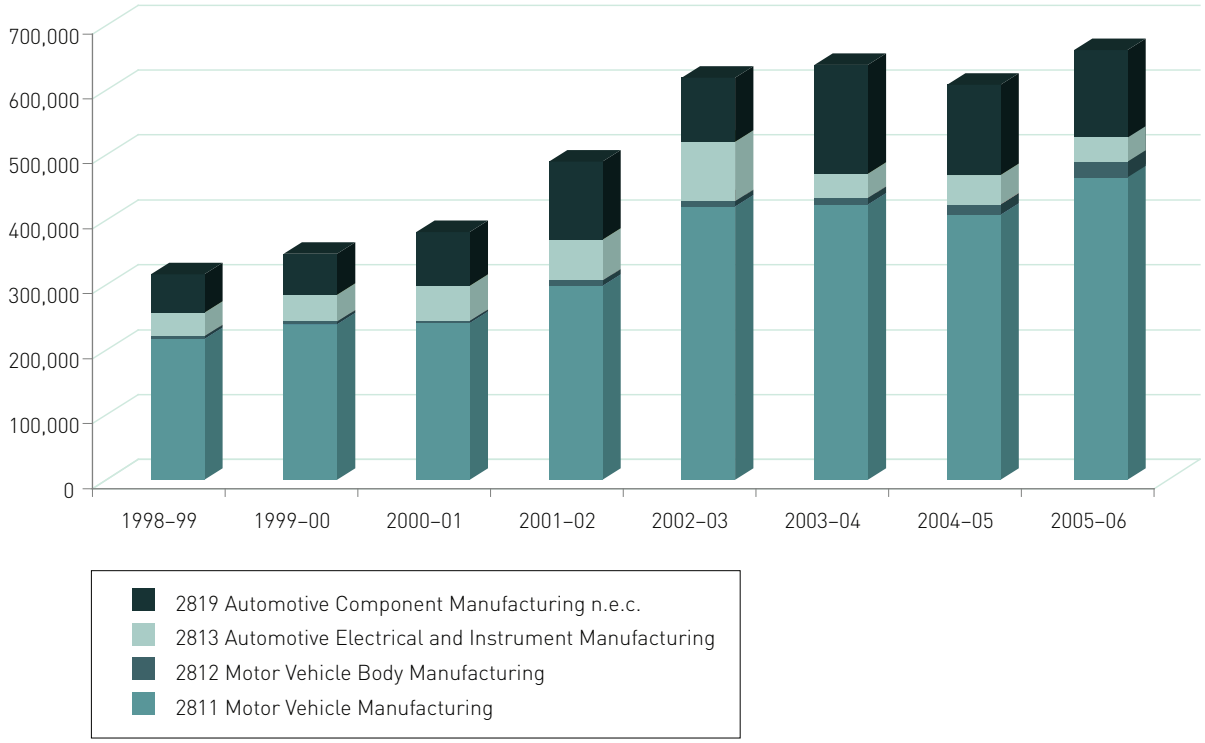
3 Australian Bureau of Statistics, *Research and Experimental Development, Businesses, Australia, 2005–06*, cat. no. 8104.0 and unpublished ABS data, cat. no. 8104.0, ABS, Canberra, 2008. It should be noted that the ABS uses the OECD definition of R&D, which is much narrower than the definition of R&D used for ACIS.

been offset by more moderate growth in motor vehicle manufacturing BERD (115 percent increase) and automotive component BERD (114 percent increase), and a 7 percent drop in automotive electrical equipment manufacturing BERD.

However, since 2002–03, the level of BERD in the automotive sector has plateaued at around $600 million. In particular, as shown in Figure D.2, while the annual average growth in automotive sector BERD has tripled since the introduction of ACIS, it has lagged behind the growth in BERD by the manufacturing sector as a whole (and by total BERD) over the same time frame. In addition, growth in BERD in the automotive sector has been slower since the introduction of ACIS compared with pre-ACIS growth rates. This could reflect, in part, growth from a low base in the 1990s and the 'plateauing' effect in recent years. In 2002–03, BERD from the automotive sector represented nearly 22 percent of total manufacturing BERD, but by 2005–06 this figure had dropped to 17 percent.

The R&D intensity of the automotive industry was 11.6 percent in 2005–06.[4] This is around three times higher than for manufacturing as a whole and around nine times higher than for the economy.

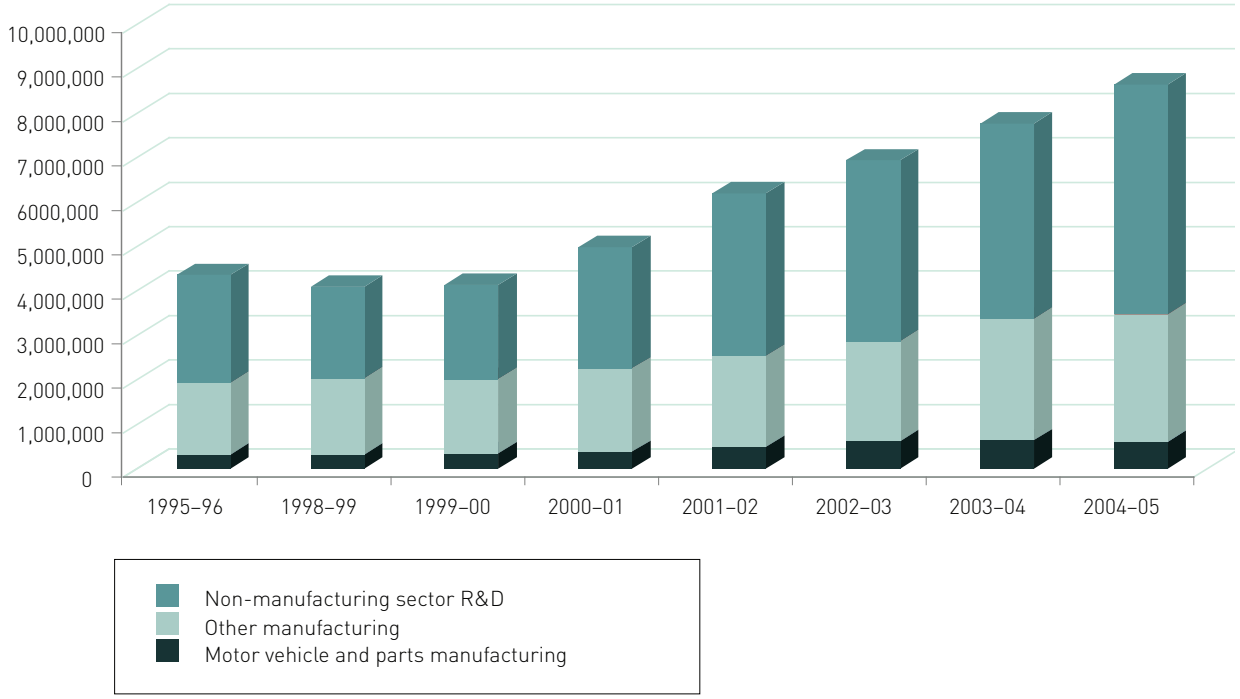
Figure D.1. BERD in the automotive sector and its subdivisions ($'000), 1998–99 to 2005–06



Source: Australian Bureau of Statistics, 2008.

4 As measured by BERD as a proportion of industry value added.

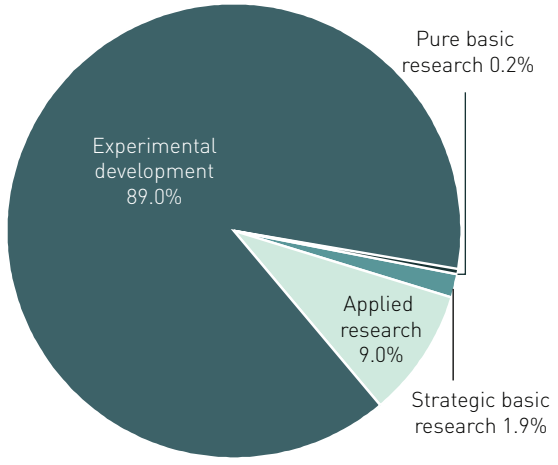
Figure D.2. Combined BERD of automotive, manufacturing and non-manufacturing sectors ($'000), 1995–96 to 2005–06



Source: Australian Bureau of Statistics, 2008.

Around 89 percent of the automotive sector's BERD was for experimental development, with very little pure or basic strategic research (see Figure D.3). This suggests that the Australian automotive industry is focused on product development as opposed to the development of new technologies. Around 90 percent of the sector's BERD is sourced from own funds; the Australian Government is the other major funding source, which includes the R&D tax concession and cooperative research centre programs.

Figure D.3. Types of R&D in the automotive sector, 2005–06

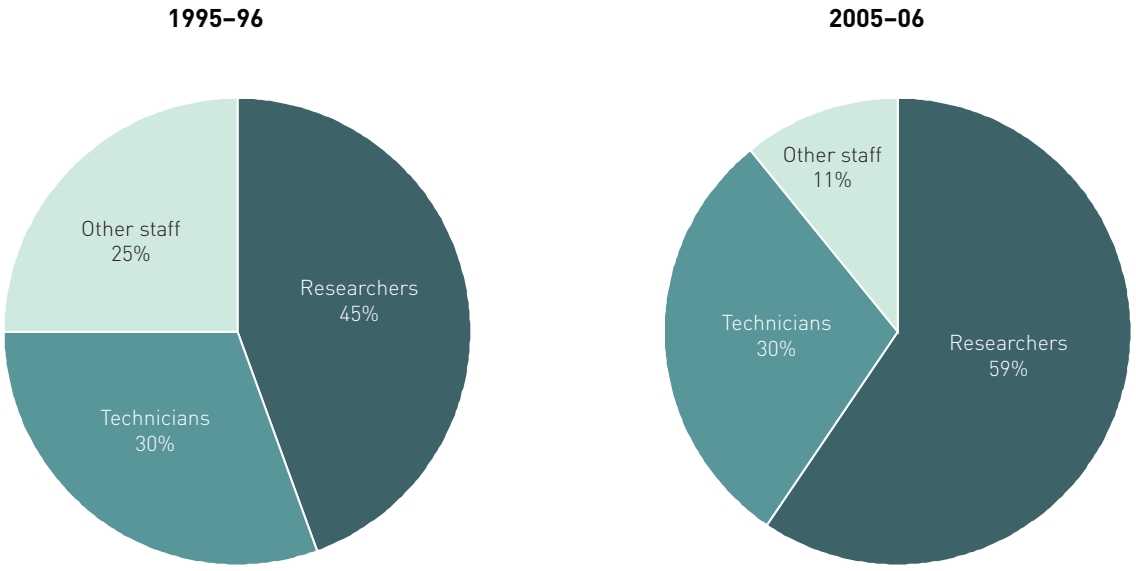


Source: Australian Bureau of Statistics, 2008.

The automotive sector employed 3,307 researchers, technicians and other supporting staff in undertaking R&D in 2005–06. Compared to a 6.9 percent annual growth in the five-year period before the introduction of ACIS, the annual growth in human resources devoted to R&D had moderated to 4.41 percent.

Another observation of interest is that in the past decade there has been a significant change in the mix of R&D employment in the automotive industry, with researchers now accounting for nearly 60 percent of all human resources devoted to R&D – in 1995–96, this figure was 44.5 percent (see Figure D.4). Over the same period, there has been a fall in the share of researchers devoted to R&D for all businesses – falling from 57.5 percent in 1995–96 to 53.9 percent in 2005–06 (with the share of technicians increasing).

Figure D.4. Type of staff employed in R&D activities in the automotive sector, 1995–96 and 2005–06



Source: Australian Bureau of Statistics, 2008.

Growth in wages and salaries paid to those devoted to R&D has been broadly similar for both the automotive industry and for all businesses. Wages and salaries in the automotive industry grew by 56 percent in nominal terms over the 10 years to 2005–06, compared with 54 percent growth for all businesses. This increase in wages can be attributed to the increasing number of researchers over technicians (who generally work under researchers) and 'other' support (who also work under researchers and generally perform administrative or clerical tasks related to R&D).

R&D IN INDIVIDUAL AUTOMOTIVE SUBDIVISIONS

Motor vehicle manufacturing

This sector consists of units mainly engaged in manufacturing motor vehicles or motor vehicle engines.

BERD by the motor vehicle manufacturing sector increased by nearly 8 percent per annum over the 10 years to 2005–06. This was much higher growth than for manufacturing as a whole, but was significantly lower than for total BERD. Since 2000–01, growth in BERD by the motor vehicle manufacturing sector has been below that for manufacturing and for total BERD.

Between 1995–96 and 2005–06, the total of human resources devoted to R&D for the motor vehicle manufacturing sector has increased by 82.8 percent while labour costs have increased by 166.5 percent.

This has led to average wages and salaries increasing from $75,729 in 1995–96 to $110,418 in 2005–06. This increase in wages can be attributed to the increasing percentage of research staff compared to technicians and 'other' staff. In 1995–96, only 47.5 percent of R&D staff were researchers, but the figure rose to 65.9 percent in 2004–05.

Motor vehicle body manufacturing

This sector consists of units mainly engaged in manufacturing motor vehicle bodies (including buses and trucks), caravans and trailers, and in vehicle modifications involving permanent changes to bodywork using an existing engine and chassis.

BERD for the sector increased by 24.3 percent per annum over the decade to 2005–06. It has also increased by a very strong 51.2 percent since 2000–01, albeit from a very low base.

Human resources devoted to R&D have experienced similar strong increases. However, the proportion of the more highly trained researchers to support staff remains low (only 34.5 percent of staff were researchers in 2004–05). This can be compared to the total motor vehicle sector, where 59.7 percent of R&D staff were researchers.

Automotive electrical and instrument manufacturing

This sector consists of units mainly engaged in manufacturing automotive electrical components, automotive air-conditioners or instruments.

BERD by the automotive electrical and instrument manufacturing sector fell 9.3 percent in the 10 years to 2005–06. Over the same period, human resources devoted to R&D increased from 209 to 312 person-year equivalents. It should be noted that the ratio of researchers to other support staff has actually decreased between 1995–96 and 2004–05.

Automotive component manufacturing not elsewhere classified (n.e.c.)

This class consists of units mainly engaged in manufacturing motor vehicle parts not elsewhere classified. It includes the manufacture of clutches, gearboxes, radiators and mufflers.

Over the decade to 2005–06, BERD by this sector grew by 7.64 percent per annum – above the growth for manufacturing as a whole, but below the growth by the motor vehicle manufacturing sector and for total BERD.

Human resources devoted to R&D increased by 45.4 percent in total over the 10 years to 2005–06 while labour costs for the sector increased by 164.8 percent over the same period. This led to average costs per employee in R&D increasing from $48,044 in 1995–96 to $87,440 in 2005–06. This coincided with an increase in the proportion of research staff from 36.7 percent in 1995–96 to 50.4 percent in 2005–06.

APPENDIX E:
QUANTITATIVE SPILLOVER STUDY – PATENT CITATIONS

TECHNOLOGY SPILLOVERS FROM AND TO THE AUSTRALIAN AUTOMOTIVE INDUSTRY. A STUDY BASED ON PATENT SPILLOVERS

by

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17 June 2008

Abstract:

This study uses patent citations to map spillovers from and to the Australian automotive industry. The paper starts with a discussion of the way in which citations can be used to measure spillovers, and what the limitations of such an approach are. It then presents some descriptive statistics, covering both a so-called industry of manufacture perspective (which considers the automotive industry as a sector that generates technological change itself), and an industry of use perspective (which considers the automotive sector as a sector that sources technological change from other industries, including itself). In both cases, the machinery and equipment sector is an important receiver of spillovers from the automotive sector, as are other industries producing transport equipment. When an industry of use perspective is used, important amounts of spillovers are also found for "automotive-using" industries such as (land) transport, sales of motor vehicles, and private households. The study also finds that spillovers from the automotive sector are relatively concentrated, i.e., affect a relatively small number of other industries.

1. INTRODUCTION

This is a commissioned study on technology spillovers from and to the Australian automotive industry. The study uses patent citations as indicators of spillovers. The primary product of the study, which is supplied in the form of an Excel sheet, is a pair of spillover matrices in which the automotive industry is both a row and a column. The two matrices correspond to the two perspectives used in this study: industry of manufacture and industry of use. The first of these perspectives, industry of manufacture, looks at knowledge that is produced in the automotive sector (or other sectors), the second perspective, industry of use, looks at where knowledge is used.

This document is organized as follows. In Section 2, the methodology is laid out. This contains a subsection with important issues that concern the interpretation of the measures that are provided in this study. Even the reader not primarily interested in methodology should read this subsection (2.4). Sections 3 and 4 contain a presentation of the main results. Section 3 looks at spillovers from the automotive industry, and Section 4 at spillovers to the automotive industry. Each of these sections is subdivided by the two perspectives. Finally, Section 5 contains some broad conclusions.

2. METHODOLOGICAL NOTES

2.1. Patent citations as measures of technology spillovers[1]

This study uses patent citations as an indicator of technology spillovers. The basic idea is that if patent *A* cites patent *B*, the inventor of *A* must have learned something from *B*. While this is an intuitive idea, it builds strongly on the citation practice in scientific papers, which is different from patent citations. In order to arrive at a valid interpretation of patent citations, one must therefore pay attention to the way in which patent citations differ from citations made in science. This will be done, in a brief way, in the current section. The conclusion from this brief overview is that patent citations are valid, but incomplete and noisy indicators of technology spillovers.

Patents contain references to prior patents and scientific literature. The legal purpose of references in patents is to indicate which parts of the knowledge described are claimed in the patent and which parts other patents or non-patent documents have claimed earlier. As Collins and Wyatt (1988) explain, the applicant "must set out the background in such a way as to show how the claimed invention relates to, but is innovatively different from what was already public knowledge" (p.66), and his/her task is also to identify work "either related to but significantly different from, or else a useful step towards, the new invention or a use of the invention".

Patent citations are different to references in journal articles in two respects. First, while academic citations are mainly the prerogative of the author, citations in patents are the results of a highly mediated process which involves the inventor, the patent attorney and the patent examiner (Meyer, 2000). Second, articles in journals may be cited for a variety of reasons, not all of them reflecting recognition of work done previously or a transfer of knowledge. Authors may cite articles for strategic reasons, for example, because the authors of the cited article are potential reviewers. Instead inventors have an incentive not to cite patents unnecessarily, as it may reduce the claim of novelty of the invention and therefore the scope of the monopoly rights granted by the patent.

In principle, when a patent cites another patent, this indicates that the knowledge embodied in the cited patent has been in some way useful for developing the new knowledge described in the citing patent and that the citing patent has no claim over that particular knowledge. This is the line of reasoning offered in Jaffe *et al.* (1993), and Jaffe and Trajtenberg (1996 and 1998). Thus, patent citations represent a 'paper trail' of knowledge flows between the citing and the cited inventor, although as pointed out by Jaffe and Trajtenberg (2002) 'one that is incomplete and mixed with a fair amount of noise' (p. 12).

Patent citations are an *incomplete measure of knowledge flows* because they only capture those flows that result in a novel and patentable technology and therefore they cannot be used to make inferences about knowledge transfers that do not result in a patent, such as tacit forms of knowledge, learning via imitation or reverse engineering. It should also be emphasised that knowledge flows are a much broader concept than simply what is captured by patent citations. In terms of the distinction introduced by Griliches (1992), patent citations focus on a specific form of pure knowledge spillovers. Rent spillovers, which reflect the fact that prices do not completely embody quality improvements resulting from R&D activities, are completely ignored. However, as correctly pointed out by Breschi and Lissoni (2001),

1 The text of this section draws to a large extent on Criscuolo and Verspagen (2008).

although in theory patent citations try to measure pure knowledge spillovers, empirically it is hard to exclude those knowledge flows (giving rise to patent citations) which are mediated by markets or market mechanisms. Even within the category of pure knowledge spillovers, patent citations (to the extent that they are related to spillovers) are only a part of the story. For example, in order for patents to be cited, both the spillover-receiving and spillover-generating firm must be actively engaged in R&D and apply for patent protection. Therefore knowledge flows can occur without generating citations.

Patent citations are a *noisy measure of knowledge flows* because, though suggested by the inventor together with his attorney, the final decision on which patents to cite lies ultimately with the patent examiner. This implies that the inclusion of a given citation does not necessarily indicate that the inventor has knowledge of the technology underlying the cited patent and, thus, they do not represent an actual knowledge source utilised by the inventor in the development of the invention. In this study we will be able to eliminate this source of noise, although it is possible to identify three other sources (Jaffe et al., 1998). The first derives from the intervention of the patent attorney who may decide to cite a patent not considered prior art by the inventor. The attorney may be trying to avoid the risk of future legal battles (strictly legal citation). The second is connected with the possibility that inventors might have learnt about the cited invention only after the development of their own invention (after-fact citation). In this case citations cannot be interpreted as sources of knowledge contributing to the development of the citing patent, but they still represent realised knowledge flows between the citing and cited inventor. The third source of noise is associated with the citation of patents which, while not directly drawn upon by the inventor in the inventing process, are nonetheless seen as basic to this process (teaching citation).

Similar arguments have been raised by Breschi and Lissoni (2004) against the interpretation of patent citations as a proxy for inter-personal knowledge spillovers. These authors distinguish between two types of innovative efforts resulting in patents: cumulative efforts, i.e. the citing inventor built upon the knowledge developed by the cited patent, and duplicative efforts, i.e. the citing inventor duplicated the cited inventor research. In the latter case citations might take place with no exchange of knowledge between inventors and they are not associated to either awareness or intellectual debt between the cited and citing patent. When patents are the result of cumulative innovative efforts citations might be the result of either the citing inventor search in patents database, which does not correspond to inter-personal knowledge flows, or word of mouth diffusion process, which do reflect knowledge flows.

Despite all these limitations, some recent studies have shown that patent citations can be used as a proxy for knowledge flows. Jaffe *et al.* (2002) surveyed a sample of inventors of USPTO patents and asked them about the extent and the mode of their communication with the inventors they cite and about the extent to which a patent citation was indicative of this communication. The authors found evidence that a significant fraction of the links indicated by patent citations reflect some kind of spillover. Almost 40% of the inventors indicated that they learnt about the cited invention either before or during the development of their invention. But in one-third of cases they did not know about the cited patent, which could be due to the intervention of the patent attorney or patent examiner in the citation process. Duguet and MacGarvie (2005) provide evidence on the legitimacy of citations in EPO patents as a measure of knowledge flows. Matching a sample of French firms' responses to the Community Innovation Survey with a count of citations made and received by their EPO patents, the authors were able to explore the relationship between patent citations and firms' technology sourcing behaviour. They found that citations are significantly correlated with the way firms acquire and disseminate new technologies. In particular their results indicate that backward citations, i.e. citations made to other patents by the surveyed firms, were positively and significantly correlated with learning through R&D collaboration, licensing foreign technology, M&A, and equipment purchases. Thus, the evidence gathered in these two studies goes some way towards justifying the use of patent citations between both USPTO and EPO patents as a reasonable proxy for knowledge flows regardless of the differences that exist between these two patent systems regarding the examination process and the requirements concerning the description of the state of the art.

2.2. Patent citations and industrial classifications

Patents are classified in technological classification systems. In the case of USPTO patents, which are used in this study, this is the US Patent Classification system, which currently contains some 450 main

classes, and several 10,000s of subclasses. These technological classes do not have an unequivocal relation to classification systems for economic activities, such as the Standard Industrial Classification (SIC). Therefore, in order to be able to describe technology spillovers between industries, on the basis of patent citations, a concordance between the USPC and SIC is needed.

This study uses the so-called OECD Technology Concordance (Johnson, 2002). This concordance table is based on the fact that

> "between 1972 and 1995, the Canadian Intellectual Property Office simultaneously assigned IPC codes along with an industry of manufacture (IOM) and sector of use (SOU) code to each of over 300,000 granted patents. For example, in the IPC of B05 (sprayers and atomisers), a cosmetics atomiser might have an IOM in the glass container industry or metal valve industry, while a pesticide sprayer might have an IOM in the chemical fertiliser or agricultural machinery industry. Sectors of use (SOUs) would also differ, with the cosmetics atomiser used in the personal hygiene or cosmetics sector, and the pesticide sprayer used in field crop sectors. The [...] [OTC] utilised tabulated information on all 300,000 patents to determine the probability that a patent with a specific IPC has a particular IOM-SOU combination. Since other nations only report IPC information, those probabilities allow researchers to infer the IOM-SOU details of a patent based purely on the legal technological details offered by the IPC grouping." (Johnson, 2002, p. 5).

It is important to note that this approach is essentially a statistical approach, i.e., it uses information on the large set of 300,000 patents, rather than providing a detailed picture of each individual patent. In the example of patents in class B05 in the above citation, one finds four different industries of manufacture of the patents: the glass container industry, the metal valve industry, the chemical fertiliser and the agricultural machinery industry. The concordance then applies a probability to all patents in B05 to be in either one of these four industries (e.g., each industry a 0.25 probability). But note that each individual patent in B05 will most likely cover only a subset of the four industries, as indicated in the example by the cosmetics atomiser or pesticide sprayer. The concordance, however, will assign all four industries to each patent.

This is an important caveat of the OTC, since it may lead to a bias in the estimations of spillovers provided here. For example, suppose that a country has no firms at all in the chemical fertiliser and the agricultural machinery industry. As a result, patents in B05 will refer only to the glass container industry and the metal valve industry. But the OTC will assign the patent to the four industries, rather than just the two that are relevant for this particular country. (Of course, this is an extreme example, and real-world cases will yield more subtle biases).

There are other, more technical, issues with the OTC. The most important one is that the OTC provides a concordance between the International Patent Classification (IPC) and SIC. However, the patent database that is used in this study primarily classifies patents in the USPC. Thus, in order to use the OTC, USPC classes must be translated to IPC classes. This is done using information from the EPO Espacenet database, which provides, for each US patent, IPC codes.[2] It must be noted however, that since each concordance in itself is an approximation, the use of multiple concordances is not preferred, although unavoidable. Also, the concordance does not use any information on the actual firm who applied for the patent. Thus, for example, a patent that is assigned to the automotive industry may be filed by a firm that in fact is in a different industry.

In the end, the OTC is a reliable concordance table, and in addition it provides an interesting opportunity to assign patents to two types of industries: industry of manufacture, or industry of use. This distinction in itself has been used to map spillovers. For example, Van Meyl (1997), constructed a matrix of technology spillovers assuming that knowledge spills over from the industry of manufacture of a patent to the industry of use. Such a procedure avoids the use of patent citations all together, since it relies only on a single patent.

The current study, aimed at using patent citations, applies the industry of manufacture vs. industry of use distinction in a different way. It will produce two types of spillover estimates. One from the industry of manufacture perspective, which is the usual perspective, and one from the industry of use perspective. In the first case, the measure for spillovers from (to) the automotive industry captures the knowledge that originates in the automotive industry, and asks which spillovers this knowledge produces (uses). In the second case, the industry of use perspective, the spillover measure starts by asking which knowledge is sourced by the automotive industry, and subsequently asks which spillovers this produces (uses).

2 An alternative is to use the USPTO's own USPC-to-IPC concordance, but this is harder to implement in a practical way.

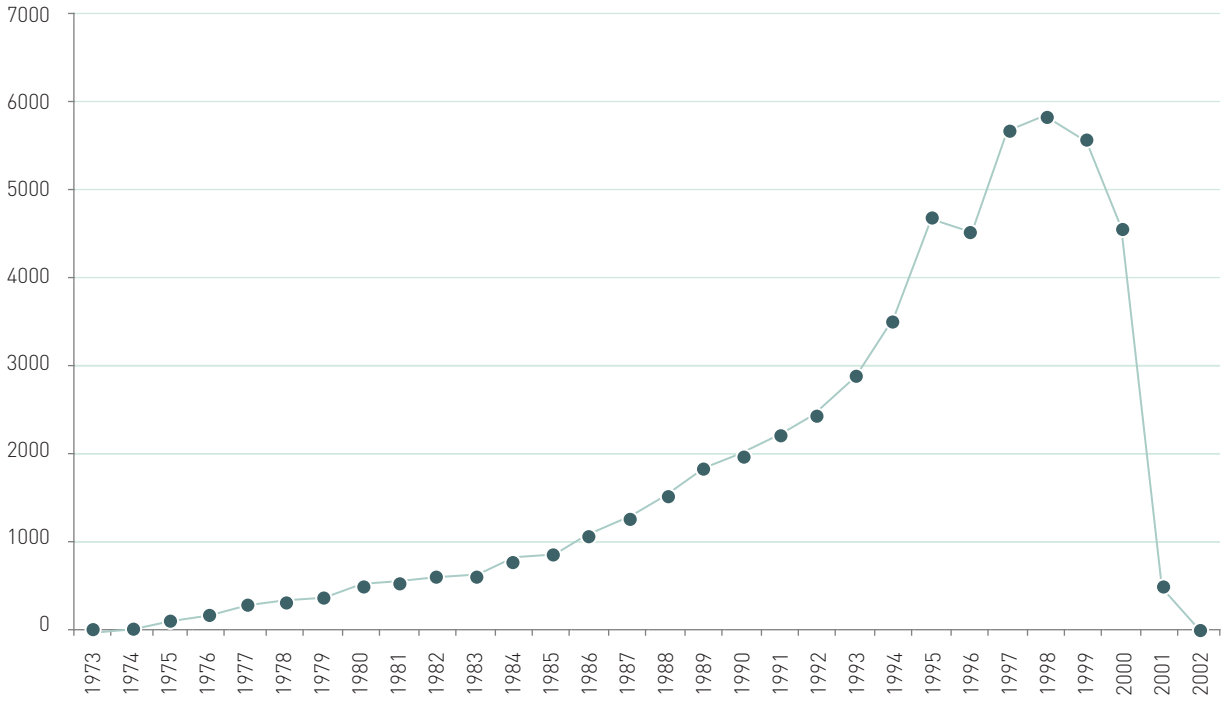
2.3. Implementation issues

This study uses the so-called NBER patent database (Jaffe and Trajtenberg, 2002). This includes patents in the US, but including patents awarded to foreign applicants (e.g., Australian firms, organizations or persons). The version of the database that was used includes all patents granted during the period January 1975 – December 2002. Although more recent data are in principle available directly from the USPTO, these data do not benefit from a crucial feature in the NBER database, which is the fact that applicant names in the NBER database have been standardized. This allows the researcher to exclude so-called self-citations, i.e., citation pairs where the citing and cited applicant are the same. This study always excludes these self-citations.[3]

13,303 patents with Australian inventor were identified for the complete period 1975 – 2002. These patents are the basis for all results described in this study. Using the NBER citation database, the 13,303 Australian patents were used to construct citation pairs where both citing and cited patent are Australian. After removing records with incomplete information, 57,609 of such citation pairs remained. About 4% of these are identified as self-citations, and hence were excluded from the analysis.

Figure 1 provides an overview of how the number of citation pairs varies per year. In order to provide a better picture of when the invention activities actually took place, the figure uses the application year of the citing patent, rather than grant year. The number of citation pairs rises steadily in time, starting from a very low number in the early 1970s. It reaches a peak 5,854 patents in 1998, after which the number drops sharply. This drop is entirely explained by the truncation of the database to patents granted before 2003. Many of the patents applied for in the period 1999 – 2002 would not have been granted by the end of 2002, and hence be excluded in the database. In addition, it usually takes a few years before a patent reaches a peak in received citations (Jaffe and Trajtenberg, 2002), and hence many of the citations of the patents granted in the last couple of years in the database would not yet be included. As a result, the data for the period after 1999 are rather unreliable, and will be excluded from the analysis.

Figure 1. Australian citation pairs in the NBER database, by year of application

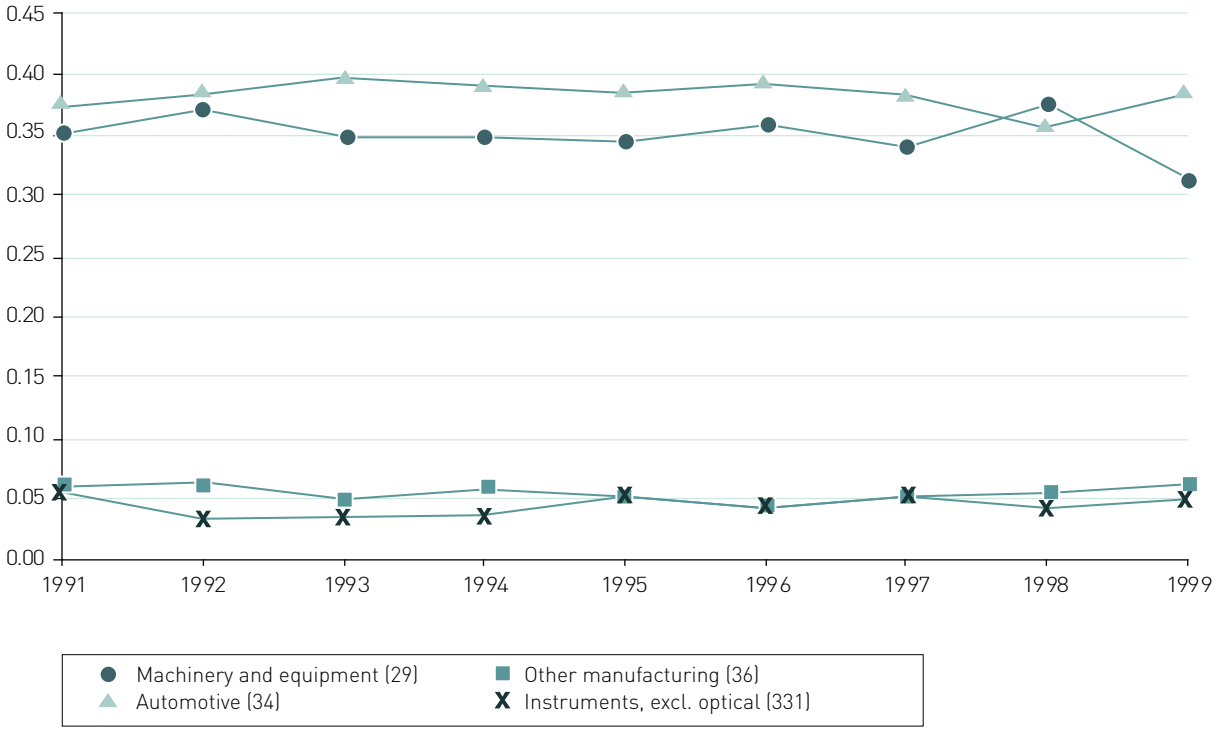


3 Note that the NBER database does not identify self citations where the relationship between cited and citing applicants is more subtle, e.g., when the cited firm is a daughter of the citing firm. Only the self-citations where cited and citing applicant are the same organization are excluded. Since private inventors are not identified by their name, but instead only by a code indicating "private inventor", all citations from a private inventor to a private inventor were included.

Also, the citations in the early period of the database refer to a small number of patents only. This is exacerbated by the focus on the automotive industry, which comprises only a small part (between 3 and 8%) of the total data. Hence the focus of the analysis will lie on the period 1991 – 1999. In 1991, there were 81 (industry of manufacture) or 112 (industry of use) automotive patents. This number was smaller in the years before 1981, leading to unreliable estimates of spillovers.

Within the period 1991 – 1999, the shares of spillover-receiving (from the automotive industry[4]) industries are relatively stable. Figure 2 provides an illustration of this finding for the industry of manufacture perspective (similar findings arise for the industry of use perspective). Although there are year-by-year fluctuations (especially towards the end), these do not seem to be very systematic. Hence the analysis below will provide results aggregated over the full period. Aggregation is done by a simple non-weighted average of the % of the totals per year.

Figure 2. Fraction of total spillovers from automotive industry, 1991–1999, 4 largest spillover receiving industries



4 The term "automotive industry" is used to describe SIC 34, of which the full title is "Manufacture of motor vehicles, trailers and semi-trailers". See the appendix.

2.4. Notes for cautious interpretation of the results

The methodological notes so far have already included a few points that should lead to careful interpretation of the results. These points can be summarized as follows:

1. Patent citations are incomplete and noisy indicators of spillovers. In particular, they capture so-called pure knowledge spillovers, but do not provide an adequate picture of spillovers related to economic transactions (so-called rent spillovers). Moreover, using patent citations as indicators of spillovers implies a certain error margin, because not all citations in fact point to spillovers.
2. The OECD Technology Concordance (OTC) that is used to assign patents to industry is based on a statistical description of 300,000 Canadian patents. To the extent that Australian patents in the US are different (in technological content) from the Canadian sample, the concordance may contain specific biases. Moreover, the fact that we had to use a USPC – IPC concordance before the OTC could be applied introduces an additional error margin.

On top of this, one important further consideration applies:

3. There are important differences between industries with regard to the propensity to patent, i.e., with regard to the fraction of all innovations that are patented. It is well-known that not all inventions are patented (Levin et al, 1987), and the degree to which this is the case differs by industry (e.g., it is generally considered to be high in pharmaceuticals, and low in aerospace). Industries that have a low propensity to patent will also tend to cite less other patents. Hence the differences in the propensity to patent will tend to introduce biases in the citation matrix between industries that is the basis for this study.

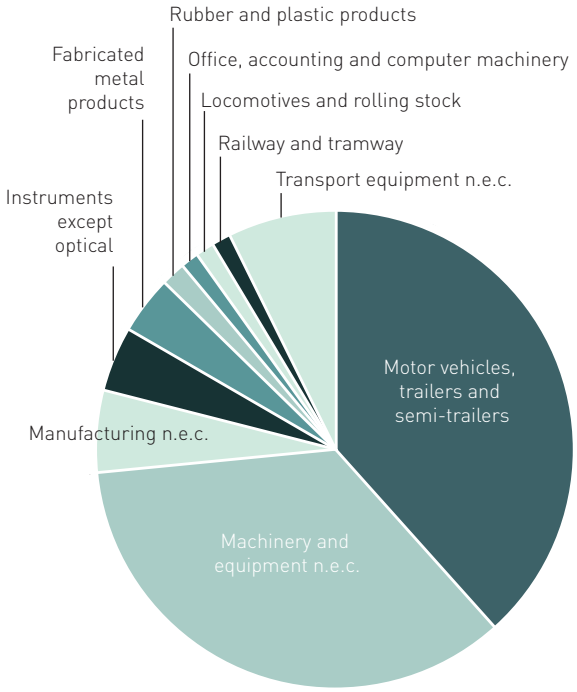
In order to reduce this bias as much as possible, the study will use a matrix that describes, for each spillover-generating industry, which fraction of its total spillovers go to which industry. In other words, in a spillover matrix where the row indicates the spillover-generating industry, and the column the spillover-receiving industry, the cells will be standardized by dividing by the row-sum. As a result, the sum of each row will be equal to one.

3. SPILLOVERS FROM THE AUTOMOTIVE INDUSTRY

3.1. Industry of manufacture perspective

The largest spillover receiving industry from patents originating in the Australian automotive industry is the automotive industry itself. Over the period 1991 – 1999, it captures 38% of all spillovers. A close second is the machinery and equipment industry (35%). All other industries receive less than 6% of spillovers from the automotive industry. Figure 3 provides a graphical description of spillovers from the automotive industry. The figure shows clearly that spillovers from the automotive industry are very concentrated: two industries (including the automotive industry itself) capture about two thirds of total spillovers. This notion of concentration will be investigated in a comparative perspective below.

Figure 3. Percentual distribution of spillovers from the automotive industry, 1991-1999, industry of manufacture perspective



Some industries are larger spillover receivers than others. In particular, the machinery and equipment sector is a large receiver of spillovers from all industries. On average, it receives 30% (unweighted average over industries) of all spillovers during the 1991-1999 period. Hence it may be argued that it comes as now surprise that this industry captures such a large share of spillovers coming from the

automotive industry. Other large spillover capturing industries are other manufacturing, other chemicals, and instruments. Two of the latter three industries also rank high as spillover receivers from the automotive industry in Figure 3.

In order to bring out the distinctive features of the automotive industry in a clearer way, one may look at the relative spillover-receiving intensity, which is defined as the share of spillovers received from the automotive industry, divided by the average share received from all industries. A number higher (lower) than 1 indicates that an industry relies relatively intensively on spillovers from automotive. There are four (out of 53) industries in the sample with a value higher than one: the automotive industry itself (13.6), rail- and tramway locomotives and rolling stock (2.63), other transport equipment (2.03) and the machinery and equipment sector (1.18). All other sectors show a value less than 1, which indicates that they tend to receive a lower percentual share of spillovers from the automotive sector than they receive from other sectors.

Finally, the issue of concentration of spillovers will be addressed. An indicator that measures concentration is the so-called inverse herfindahl indicator, which, for industry j, is defined as $H_j = 1/\sum_i x^2_{ji}$, where x_{ji} is the share of industry j spillovers that industry i receives. The maximum possible value of H is 53 (the number of industries), this value is found if spillovers are equally distributed over all 53 industries. The minimum possible value is 1, which results if all spillovers are concentrated in one industry only.

Among the 53 industries, the average value of H is 5.0, the median value is 4.9. Since this is considerably smaller than the theoretically possible value of 53, spillover-receivers tend to be rather concentrated. The maximum value in the sample is 10.8 (in machinery and equipment). The value for the automotive industry is 3.6, which is even a bit more concentrated than the average. 13 industries have a smaller value for H than found in the automotive industry.

3.2. Industry of use perspective

As in the case of the industry of manufacture perspective, the industry of use perspective identifies the automotive industry itself as the largest receiver of automotive spillovers. Figure 4 shows the distribution of automotive spillovers over receiving industries. The percentage of automotive spillovers that remains in the industry is now 36.4, which is slightly lower than in the case of the industry of manufacture perspective. The second largest receiver of automotive spillovers remains the machinery and equipment industry, which receives 20% of automotive spillovers. But together, these two industries account for a smaller share of total automotive spillovers than before (slightly over ½ now, vs. about two thirds before). Other industries that receive a sizeable share of automotive spillovers are construction (4.9%), health and social work (4.4%), and other manufacturing (3.0%)[5].

The large spillover receiving industries, in general, in the case of the industry of use perspective are the machinery and equipment sector, health and social work, construction, office machinery, and other manufacturing. Thus, the sectors that receive a large share of automotive spillovers are also the sectors that receive a large share of spillovers in total. Thus, it makes sense to look at the relative strength of automotive spillover links, defined as before by the share of spillovers received from automotive divided by the average share of spillovers received from all industries.

In this case, there are seven industries that have a value of the relative spillover intensity that is higher than 1, which are documented in Table 1. The seven industries can be subdivided in two groups: transport equipment industries (including the automotive industry itself) and automotive user industries. The first group is on top of the list in Table 1. The latter group consists of sale of motor vehicles, land transport, and private households. These three industries do not produce any patents, or very few patents, themselves, and hence do not receive any spillovers from the automotive industry when the industry of manufacture perspective is used.

As may already be expected from the results in Figure 4, concentration of spillover-receiving industries is smaller in the case of the industry or use perspective. In this case, there are 64 industries, so the maximum possible value of H is also 64. The average value of H found across all industries is 11.0, the median value is 10.9. The automotive industry again ranks below this, with a value of 5.5, which indicates that spillovers emanating from the automotive industry are relatively concentrated.

5 I intend to investigate more closely which technology classes are responsible for the industries "health and social work" and "construction".

Figure 4. Percentual distribution of spillovers from the automotive industry, 1991–1999, industry of use perspective

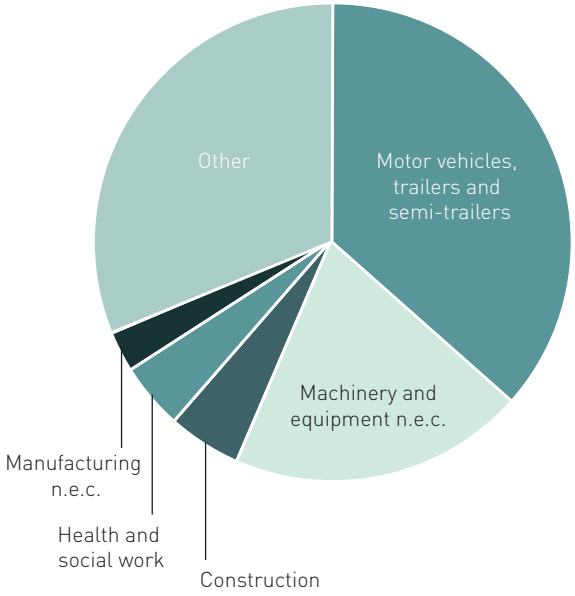


Table 1. Industries that receive more than an average share from the automotive industry, industry of use perspective

SIC code	Description	% received from automotive divided by average % received
34	Manufacture of motor vehicles, trailers and semi-trailers	9.07
352	Manufacture of railway and tramway locomotives and rolling stock	3.59
359	Manufacture of transport equipment n.e.c.	2.29
29	Manufacture of machinery and equipment	1.42
50	Sale of motor vehicles	1.30
60	Land transport	1.22
95	Private households	1.04

4. SPILLOVERS TO THE AUTOMOTIVE INDUSTRY

4.1. Industry of manufacture perspective

There are three industries from which the automotive industry receives more than 10% of their total spillovers. These are the automotive industry itself (38.2%), rail- and tramway rolling stock and locomotives (16.4%) and other transportation equipment (16.2%). The automotive industry receives 2.8% of the total spillovers from the average industry.

There are 12 industries for which the automotive industry receives a larger than 2.8% share of total spillovers. These industries are listed in Table 2.

Table 2. Industries from which the automotive industry receives more than an average share, industry of manufacture perspective

SIC code	Description	% to automotive divided by 2.8 (= average % received by automotive)
34	Manufacture of motor vehicles, trailers and semi-trailers	13.6
352	Manufacture of railway and tramway locomotives and rolling stock	5.82
359	Manufacture of transport equipment n.e.c.	5.75
52	Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods	3.52
353	Manufacture of aircraft and spacecraft	2.63
61	Water transport	1.61
22	Publishing, printing and reproduction of recorded media	1.51
29	Manufacture of machinery and equipment	1.36
28	Manufacture of fabricated metal products, except machinery and equipment	1.15
17	Manufacture of textiles	1.14
36	Manufacture of furniture; manufacturing n.e.c.	1.06
K	Real estate, renting and business	1.02

4.2. Industry of use perspective

Using the industry of use perspective, the three industries from which the automotive industry receives the largest share of their spillovers, are the same as in the industry of manufacture perspective. These three industries are the automotive industry itself (36.4%), other transportation equipment (18.9%), and rail- and tramway rolling stock and locomotives (16.8%). Table 3 lists the 14 industries that are relatively intensive suppliers to the automotive industry.

Table 3. Industries from which the automotive industry receives more than an average share, industry of use perspective

SIC code	Description	% to automotive divided by 4.0 (= average % received by automotive)
34	Manufacture of motor vehicles, trailers and semi-trailers	9.07
359	Manufacture of transport equipment n.e.c.	4.71
352	Manufacture of railway and tramway locomotives and rolling stock	4.19
50	Sale of motor vehicles	2.44
353	Manufacture of aircraft and spacecraft	1.94
95	Private households	1.87
60	Land transport	1.82
29	Manufacture of machinery and equipment	1.66
36	Manufacture of furniture; manufacturing n.e.c.	1.39
351	Building and repairing of ships and boats	1.25
63	Supporting and auxiliary transport services	1.23
28	Manufacture of fabricated metal products, except machinery and equipment	1.14
20	Manufacture of wood and wood products	1.14
51	Wholesale trade	1.04

5. CONCLUSIONS

The automotive industry in Australia is an industry from which spillovers are relatively concentrated. It serves only a few other industries with large quantities of spillovers from its own technological activities. The industries that are among the ones receiving a large amount of spillovers from the automotive industry are machinery and equipment, other manufacturing, and the other transportation equipment industries (mostly railroad equipment and other transportation equipment).

Applying an industry of use perspective adds to this the importance of a number of automotive user industries as industries that receive a large fraction of automotive spillovers. These include sale of motor vehicles, land transport, and private households.

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APPENDIX

code	iom?	Description
1	1	Agriculture, hunting and related service activities
2	0	Forestry, logging and related service activities
5	1	Fishing, operation of fish hatcheries and fish farms; service activities incidental to fishing
10	1	Mining of coal and lignite; extraction of peat
11	1	Extraction of crude petroleum and nat. gas; services incidental to oil and gas extraction excluding surveying
12	0	Mining of uranium and thorium ores
13	1	Mining of metal ores
14	1	Other mining and quarrying
15	1	Manufacture of food products and beverages
16	1	Manufacture of tobacco products
17	1	Manufacture of textiles
18	1	Manufacture of wearing apparel; dressing and dyeing of fur
19	1	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear
20	1	Manufacture of wood and products of wood and cork, except furniture; manuf. of articles of straw, plaiting
21	1	Manufacture of paper and paper products
22	1	Publishing, printing and reproduction of recorded media
23	1	Manufacture of coke, refined petroleum products and nuclear fuel
241	1	Manufacture of basic chemicals
242, ex. 2423	1	Other chemical products, ex. pharmaceuticals
2423	1	Manufacture of pharmaceuticals, medicinal chemicals and botanical products
243	1	Manufacture of man-made fibres
25	1	Manufacture of rubber and plastics products
26	1	Manufacture of other non-metallic mineral products
27	1	Manufacture of basic metals
28	1	Manufacture of fabricated metal products, except machinery and equipment
29	1	Manufacture of machinery and equipment n.e.c.
30	1	Manufacture of office, accounting and computing machinery
31, ex. 313	1	Electrical machinery and apparatus, ex. cables and wires
313	1	Manufacture of insulated wire and cable
321	1	Manufacture of electronic valves and tubes and other electronic components
322	1	Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy
323	1	Manufacture of television and radio receivers, sound or video recording/reproducing apparatus
331	1	Manufacture of medical appliances and instruments and appliances for measuring, checking, testing, navigating and other purposes, except optical instruments
332	1	Manufacture of optical instruments and photographic equipment
333	1	Manufacture of watches and clocks
34	1	Manufacture of motor vehicles, trailers and semi-trailers
351	1	Building and repairing of ships and boats
352	1	Manufacture of railway and tramway locomotives and rolling stock
353	1	Manufacture of aircraft and spacecraft
359	1	Manufacture of transport equipment n.e.c.
36	1	Manufacture of furniture; manufacturing n.e.c.
37	0	Recycling
40	1	Electricity, gas, steam and hot water supply
41	0	Collection, purification and distribution of water

code	iom?	Description
45	1	Construction
50	0	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel
51	1	Wholesale trade and commission trade, except of motor vehicles and motorcycles
52	1	Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods
55	0	Hotels and restaurants
60	1	Land transport; transport via pipelines
61	1	Water transport
62	0	Air transport
63	1	Supporting and auxiliary transport activities; activities of travel agencies
641	0	Post and courier activities
642	1	Telecommunications
J	0	Financial intermediation
K	1	Real estate, renting and business
72	1	Computer and related activities
73	1	Research and development
75	1	Public administration and defense; compulsory social security
80	0	Education
85	1	Health and social work
O	1	Other community, social activity
95	0	Private households with employed persons

Legend: Code gives SIC code, 'iom?' indicates whether industry is included as industry of manufacture in the Australian sample, see Johnson (2002).

APPENDIX F: QUALITATIVE SPILLOVER CASE STUDIES

PROJECT SUMMARY

The Department of Innovation, Industry, Science and Research invited Techstrat Research Pty Ltd to conduct a small qualitative study of knowledge spillovers from the automotive sector to other sectors. Techstrat conducted interviews at six companies – Toyota, Bosch, Broens, EDAG, Marand, and OzPress – and the University of Melbourne, and identified the three classes of spillovers:

- spillovers from automotive work to other non-automotive work conducted within the company;
- spillovers to suppliers; and
- spillovers to others.

SPILLOVERS WITHIN THE COMPANY

The category of spillovers within a company fell into five subgroups. First, and most obviously, all the firms studied applied the engineering and production capabilities they had developed for the automotive sector to other sectors. For example, OzPress, which is a small pressing shop, now presses parts for ride-on lawnmowers in much the same way as it did for car parts. As the companies became larger and more sophisticated, so did the capabilities and systems they applied to these other sectors. Notwithstanding, the work was fundamentally predicated on the company's experience in the automotive sector.

Second, and relatedly, three of the companies – Bosch, Marand and OzPress – also translated key philosophies and approaches they had applied to their automotive work to work they did in other sectors. For example, while Bosch's principal work is in the automotive sector, it applies the same basic approaches (the Bosch production system, which is very similar to the Toyota production system) to its work in consumer goods, building technology and industrial systems.

Third, three of the companies identified capabilities they developed from their automotive work, and saw ways in which these capabilities could be applied to other sectors. These companies have used this as a vehicle for entering new sectors. For example, EDAG entered the military refurbishment market on the basis that by bringing project and program management skills from the automotive sector, it could dramatically reduce the cost of supply. This spillover has created income from overseas and local highly skilled jobs.

Fourth, some of the companies took approaches from their automotive sector work and applied them to their internal operations. For example, Broens uses total quality management principles in the way it conducts its entire business operations.

Finally, at the University of Melbourne the automotive sector creates a context for teaching fluid mechanics and thermodynamics. Although many other contexts could be used in the teaching, the fact that there is a local automotive industry allows the lecturers to bring in examples from the industry in general, and from their consulting and research experience in particular, to make the material more interesting and relevant for the students.

SPILLOVERS TO SUPPLIERS

Spillovers to suppliers fell into two groups. The first involved moving suppliers into different sectors as the

companies themselves moved. For instance, Marand is at the head of the supply network (Tier 1) of many suppliers (Tiers 2 and 3). As it has moved its own work into areas such as maintenance equipment for railway management, it has taken its suppliers with it.

The second spillover involved transferring particular competencies to suppliers as part of the automotive work. The suppliers presumably can use these competencies in their work for other sectors. For instance, Bosch applied significant resources to help its suppliers increase the effectiveness of their logistics, their cost of supply, and the quality of their products. This transfer of competencies to suppliers can potentially be used in other non-automotive sectors. Supplier development programs such as those undertaken by Toyota ensure that its world-class production methodology and practices are passed on to the entire supply chain.

SPILLOVERS TO OTHERS

Spillovers to others fell into four groups. First, employees leave the companies studied and work in other sectors. Two groups are of particular note. Some of the companies, such as Broens and Marand, have large apprenticeship programs. Many of their apprentices leave and work in other sectors. Further, senior employees with particular experience (such as experience working with the Toyota production system) move to companies in other sectors with the specific mandate to transfer their expertise from the automotive sector into that other company.

Second, companies would transfer expertise to companies outside the sector. Two of the companies were involved in the Innovation Insights program run by the Victorian Government. As part of the program, they would host regular visits from other companies that wanted to learn about their production systems. One interviewee was a member of a benchmarking group comprising companies principally from the mining sector. On benchmarking tours there would be transfer of expertise between the companies.

Third, four of the companies – Toyota, Bosch, Broens and Marand – were actively involved with local TAFE colleges in the creation of training programs, both for their employees and for others. This often included hosting employees from other companies to use their facilities as part of their training. Furthermore, students in these institutions will benefit from lecturers with specific knowledge of automotive industry practices such as the Toyota production system, which can then be applied to other industries.

Finally, researchers at the University of Melbourne were interested in transferring knowledge and artefacts from the automotive industry to other sectors. For instance, the engines manufactured at the Ford Geelong plant or the Holden Port Melbourne plant had lower costs and were highly efficient potential stationary power sources. They could be used very efficiently for applications such as running the air-conditioning compressors on large buildings directly, instead of using electric motors.

These different uses are summarised in Table F.1.

Table F.1. Different uses of knowledge spillovers

	Internal spillovers					Spillovers to suppliers		Spillovers to others			
	Apply automotive engineering and production capabilities to other sectors	**Translate automotive philosophies and approaches to other sectors**	**Use automotive capabilities to diversify into other sectors**	**Use automotive techniques elsewhere in company (e.g. admin)**	**Automotive provides context for transmission of generic knowledge**	**Move suppliers into different sectors as they move**	**Help suppliers develop particular competencies they can apply elsewhere**	**Employees move to companies in other sectors**	**Collaborate with TAFE colleges to train other companies or others' employees**	**Visits from other companies or benchmarking tours with other companies**	**Transfer specific technical artefacts to other sectors**
Toyota		Toyota Production System is taught to suppliers who use this knowledge in other industries		Toyota Production System			Toyota has world-class production and engineering capabilities that it passes on to its supply chain		Yes	Yes	
Bosch		Consumer goods, building technology, industrial technology		Bosch production system			Logistics effectiveness, cost of supply, quality	Especially experienced personnel	Yes	Innovation Insights program	
Broens	Aerospace, military, mineral exploration, yachts		Military hardware, software, hydraulics, electronics.	TQM		Yes		Esp. apprentices	Yes		
EDAG	Aerospace, military refurbishment, ship fitting		Project management and program management			Aerospace, military refurbishment					
Marand	Aerospace – maintenance of equipment, tools and systems. Rail – equipment for rolling stock maintenance. Heavy trucking in China. An emerging industry	Food, plastics, construction, robotics, etc.	Rail – Maintenance of equipment for maintenance of rolling stock Project management and program management			Operates at head of a supplier network. Has taken network into other sectors		Experienced personnel and apprentices	Yes		
OzPress	Lawnmowers	Lawnmowers				Lawnmowers	Toyota production system			Innovation Insights, benchmarking	
Melbourne University	Apply thermodynamics to aerospace, power generation etc.	Application of cost optimisation techniques to aerospace			Yes – Autos as the context for teaching fluid mechanics and thermodynamics						E.g. use of car engines to run air-conditioner compressors

TOYOTA

Toyota Australia is one of three car manufacturers in the Australian automotive industry, and manufactures both the Camry and the Aurion models at its plant in Altona, Melbourne. It employs about 4,500 staff in its Australian operations.

Toyota achieved the 'Triple Crown' in Australia as of 2007, being the biggest seller of vehicles in the passenger and commercial classes, and overall. Much of this success can be attributed to Toyota's focus on efficiency through the application of the Toyota production system and the philosophy of continuous improvement. These techniques and systems are then passed on to Toyota's partnership network through programs such as C21 and ASEA, as well as Toyota Australia's own high-intensity supplier development program.

Spillovers

Spillovers to the supply chain

Toyota has broadly influenced business thinking and practice in Australia through a range of spillover mechanisms from supplier development through to skills training. Suppliers to Toyota receive a large amount of support and training about lean operations, design skills, manufacturing efficiency and quality, people management and other knowledge areas, which they can use in their supply to other industries. Other companies studied in this set (for example, Marand and Broens) illustrate such activities from the supplier perspective.

Another spillover Toyota points to is in the area of capital expenditure. Suppliers have the confidence to invest in tooling because of the presence of Toyota and other motor vehicle producers in the manufacturing industry. Quite often this equipment is used for supply to other industries, and this capacity would otherwise not exist in Australia. An example is the plastics industry, for which Toyota and others in the automotive industry build the necessary base load, capacity and expertise for the local industry to be viable. In turn, the plastic industry is able to supply other industries such as electronics and construction. Toyota executives claim that base industries such as glass and rubber benefit from similar spillovers from the automotive industry.

In 2007, Toyota opened the Toyota Institute Australia, which runs a variety of courses in the Toyota production system for suppliers (many of which supply other industries), although there is an intention to open it to a wider group of companies in the near future. A related initiative is C21, run by the Victorian Government, which offers forums on lean management, based on the SMRJ (Small & Medium Enterprises and Regional Innovation, Japan) system brought to Australia from Japan by Toyota.

Toyota supports groups such as the Society for Manufacturing Excellence and, through its multiple presentations to such forums, has seen its influence go beyond the automotive sector and even beyond the manufacturing sector. For example, participants in forums, such as hospitals, are now adopting tools like value stream mapping and lean operations.

R&D and innovation spillovers

Toyota undertakes a significant amount of research and development in Australia. There are important knowledge spillovers to research partners, such as CSIRO and universities, which are facilitated by Toyota's Australia-based research and technology centre. Several research projects have resulted in technology that benefits non-automotive industries. Toyota also practises a global model of technology development and research. The technology Toyota uses in Australia is often world-best technology, and some of it spills over to other industries.

Toyota is an advanced company when it comes to process innovation. Knowledge about how to achieve a strong culture of process innovation is at a very high level within Toyota. This knowledge is often transferred to other industries through Toyota's participation in conferences and other manufacturing sector events, which are well attended by representatives from other industries. Toyota managers are regular speakers and session leaders at a variety of conferences, not just industry-specific meetings. This includes participating speakers from wholly owned Toyota subsidiaries in Australia such as Aisin. For example, Toyota and Aisin executives gave a two-hour presentation to 40 university lecturers and professors who teach operations management and related subjects at some 30 universities in Australia as part of the 2007 ANZAM conference.

Training and education spillovers

Toyota generally makes a large investment in teaching and training, and advancing of the skills of its staff. This effort leads to two main types of spillovers. First, people leave Toyota and take process knowledge with them of the Toyota production system and Toyota leadership philosophy. For example, a major bank and a number of mining companies are currently

undertaking initiatives to adapt the Toyota production system into their contexts. Indeed, some of those companies specifically try to hire or poach ex-Toyota managers in order to speed up their learning and implementation processes. Management consultants also play a role in these spillovers, in spreading knowledge of the Toyota production system and lean management into other sectors. However, it is important to recognise that the key source of the core of this expertise originated in Toyota and is strong in Australia because of Toyota's manufacturing presence.

Another type of spillover occurs through the more formal partnerships Toyota has with educational institutions. Through these structures, learning from Toyota is passed on to participants from other industries or to those who will end up in other parts of the economy. Specifically this includes a close partnership with Mt Eliza Business School (Melbourne Business School and owned by Melbourne University), which Toyota has been working with for six years. This began with the meeting 'Toyota Leaders 1' and then followed on with 'Toyota Leaders 2', which includes transfer of knowledge on global Toyota content. Toyota content benefits other industry participants. Toyota staff mix with instructors and other industry people and the Toyota production system 'rubs off' as a spillover.

A close relationship exists with the Chisholm Institute, which supports Toyota's trade skills development program. There is also a trades teacher on site at the Altona plant. Victoria University has been involved in human movement activity for the health and safety team initiated and sponsored by Toyota. On the retail side, Toyota Institute Australia has a partnership for training with Kangan Batman TAFE. Toyota also works with regional TAFEs all around Australia to support the skills development of mechanics in its dealerships. These skills spill over to other industries as people move and courses are offered to other sectors which draw on the Toyota course.

The four specific examples above lead to improved curriculum in a wide range of courses, through institutional learning and spillovers to other programs that service other industries.

Toyota is also often a destination for executives from other industries who are on study tours, and want to visit, study and learn aspects of 'The Toyota Way', which they then use in other industries and companies. Students from schools and universities are welcomed by Toyota at its factory.

Environmental standards spillovers

Toyota Australia has set high environmental standards through its Toyota Earth Charter, which has set a policy and standard that other companies and industry players are learning from and aspire to. Toyota has been very open to researchers in Australia who have studied its methods and published results in the literature for others to learn from. For example, a recent Australian textbook, *Operations Management*, published in 2008 by Cambridge University Press, features a detailed case study of Toyota's environmental management processes in its supplier development network.

Toyota is rapidly moving forward on the triple-bottom-line approach, and spends a lot of effort and money on conservation, the environment, community engagement and social outcomes. It has developed advanced methods in these areas, which it deploys in Australia and publishes for others to adapt and use. Other companies and industries are learning about Toyota's best practices in Australia and are adapting these practices into their own operations.

BOSCH

The Bosch Group, headquartered in Germany, is a global supplier of technology and services. In the areas of automotive and industrial technology, consumer goods, and building technology, some 271,000 associates generated sales of €46.3 billion (approximately $75.9 billion) in 2007–08. The Bosch Group has more than 300 subsidiaries and regional companies in roughly 50 countries.

Bosch employs over 2,300 associates in Australia and New Zealand, with activities spanning the three business sectors listed below. The regional headquarters, which has had manufacturing operations in Australia since 1954, is located in Clayton, Victoria. This site has been implementing the global company initiative, the Bosch production system, similar to the Toyota production system, since 2004. For Bosch worldwide, the production system has led to the development of other systems including an engineering system, a sales system, and an HR system. These systems have also been deployed in Australia and rolled across from automotive into other industries that Bosch serves, thus acting as a form of internal spillover.

Business sectors of Bosch Australia

1. Automotive technology – Bosch performs design, development, application and manufacturing of automotive components and systems for domestic and export markets. Bosch also distributes products for the automotive aftermarket.
2. Consumer goods and building technology – Bosch distributes products from a portfolio consisting of power tools, household appliances, gas hot water systems and security systems.
3. Industrial technology – Bosch Rexroth, part of the Bosch Group, provides design engineers with motion control products, machine automation and applications engineering.

Spillovers

Innovation Insights program

Bosch is an active partner in the Innovation Insights program, an initiative of the Victorian Department of Innovation, Industry and Regional Development. This program gives businesses the opportunity to visit Victoria's leading manufacturers and learn about world best practice. Robert Bosch Australia has been implementing the Bosch Production System ('lean manufacturing') for a number of years now. As part of the global Bosch network, it is able to source lean manufacturing best practices from other Bosch plants around the world and implement them in Australia. In April 2008 Robert Bosch Australia hosted its Innovation Insights open day to demonstrate to and exchange lean manufacturing ideas with visitors from other enterprises. Visitors could learn about lean tools such as 5s, visual systems, milk runs, supermarkets, customer tact and effective problem solving. Thirty-nine attendees visited Bosch from different business sectors including automotive, pharmaceutical, health and human services, finance, aerospace, food, beverage and general manufacturing.

The automotive industry was the pioneer of 'lean manufacturing', with a philosophy that aims to continuously improve a company's efficiency and competitiveness. Programs such as Innovation Insights, allow other industries to benefit from the spillover of knowledge and experience in best practice and optimal processing gained in the automotive industry.

Internal Robert Bosch Australia spillover

Bosch's experience in the automotive sector, in particular lean techniques, is spilling over into other parts of its distribution business (such as consumer goods), with logistics efficiencies, planning and warehousing techniques.

Employment and skills

The shortage of skills in the Australian employment market has led to an outflow of Bosch Automotive Technology personnel with experience in lean techniques, industrial engineering and process engineering into sectors including finance, aerospace, mining and other general manufacturing industries. For example, Bosch cites instances of its engineers moving into finance, mining and aerospace companies, as well as starting independent consulting firms, specifically to apply their lean production knowledge gained from within Bosch. These other sectors are benefiting from best practice knowledge learnt in the automotive sector.

Bosch has established a Bosch Learning Centre in Australia, in which it conducts a large amount of training. A certificate IV program has been partly created in partnership with Kangan Batman TAFE, which brings staff on-site to co-develop knowledge, the curriculum and materials. The exchange of knowledge between Bosch Australia and the TAFE is a clear example of knowledge spillover, forming part of programs rolled out to other industries.

Supplier development programs

Bosch helps its local suppliers with logistics effectiveness support, and also assesses its suppliers on total cost of supply and on quality. This assists suppliers (for example, Tier 3 firms) to develop, and these skills can be used in sectors outside the automotive industry. Bosch uses its own expert logistics and supply chain expertise, and uses lean management practices to assist its suppliers to improve their lean capabilities.

Other spillovers

The special-purpose machine building division builds equipment for automotive and other industry technology manufacture. The division sources materials and services outside of the automotive sector – for example, electrical, mechanical, software design, and manufacturing – to construct new machinery and technological solutions for the company.

Other (smaller) manufacturing industries sourcing from automotive suppliers such as Bosch leverage from existing and developed attributes derived in the automotive industry including quality standards, just-in-time delivery, and competitive global pricing.

BROENS

Broens is an Australian privately owned company, established in the late 1970s, offering advanced design, precision manufacturing and engineering solutions, and serving the automotive and a number of other sectors. Its range of products includes the production of tooling, components and special purpose equipment. As part of that, Broens has developed its own significant IP in power steering systems.

Incorporating the latest technology, Broens' core capabilities include turn-key project management, innovative design, 3D modelling software, mechatronics, automation, and advanced manufacturing. The company prides itself on its high standards of quality control and its strong investment in the development of its 185 staff. These are essential ingredients to be competitive as a supplier to the automotive sector. From those roots, Broens branched into other sectors on the back of these advanced capabilities.

Broens' manufacturing shopfloor in Sydney is spread over some 12,000 square metres. It conducts tooling design and manufacture, pressed metal operations, stamping, machining and assembly including mechanical, electrical, pneumatic and hydraulic systems. According to the Managing Director, Mr Carlos Broens, "We build special purpose equipment for Tier 1 and 2 suppliers. We design and build our own machines for the power steering industry and we also produce components".

Spillovers

The engineering base at Broens came from its general precision and automotive industry participation and then spilled over into its work in the aerospace, marine, mining and Defence industries. Mr Broens asserts that without his company's experience in the automotive industry, their engineering capabilities would be limited. Those spillovers were part of a deliberate diversification strategy, as the automotive sector has become very price sensitive and 'China-dominated' due to their cheap cost of labour. As a result, profit margins in the automotive sector were reduced, leading Broens to adopt a strategy of diversification into other sectors starting with aerospace and then developing into the marine, mining and defence sectors.

The quality system, which was developed and established by Broens as an automotive manufacturer, was a significant spillover and a cornerstone for Broens' success in other sectors. The automotive sector has the most rigorous quality requirements and process standards, and this experience was invaluable when working in other industries.

In the aerospace industry, the lessons learned and skills developed at Broens through its involvement in the automotive sector have clearly been transformed for the new requirements, and are used for carbon fibre products and assembly fixtures. With computer numerically controlled machining capability of up to 18m x 6m, and an international support network, Broens has moved significantly forward in aerospace, based on its automotive beginnings.

In the marine sector, Broens focuses on the significant yachting market, where it produces keels and bulbs. Using specialist materials, Broens delivers differentiated design and products, up to 18m in length and 30 tonnes in weight; and based on its automotive experience, it produces these products to tolerances of +/- 0.1mm. Broens also offers fully machined forged steels and stainless steel structures to its customers.

Broens has benefited from taking its capabilities into the mining sector by producing exploration and drilling devices. Broens is undertaking mass production of drilling components in this industry. Broens is using the manufacturing excellence and design capability derived from its work in the automotive industry for the challenges of this intense and specialised field.

Defence sector clients have also benefited from Broens' automotive-developed expertise. Based on its automotive knowledge, Broens has sold engineering services in the defence sector, and designed and built special-purpose equipment and vehicle systems. It has also produced components for weapon systems, and added to its portfolio vehicle-based systems such as ground support equipment and aircraft loaders.

Mr Carlos Broens indicated that the spectrum of spillovers that were adapted from automotive to other sectors is wide, and includes other expertise in areas such as software, hydraulics and electronics.

On the skills front, Broens can point to some interesting human capability spillovers. As the shortage of skills presented a barrier to further growth and diversification, the company engaged in 'accelerated training' of its staff. Some 28 percent of Broens' workforce are apprentices, representing a very large proportion of total staff. Broens established a partnership with TAFE NSW for that purpose, and these skills-building efforts spill into other industries through staff turnover. TAFE courses are delivered on site using a dedicated training area and a classroom facility. TAFE teachers on Broens' site benefit from having access to the latest equipment, technology and cutting-edge methods. The firm hosts apprentices from other companies on its site, who are trained alongside Broens' staff and apprentices. These companies include Qantas, Goyen Controls and Nepean Engineering. This is a clear and valuable skill and knowledge spillover.

EDAG AUSTRALIA PTY LTD

EDAG Australia Pty Ltd is a subsidiary of EDAG GmbH & Co. KGaA. The German parent, with 5,000 employees in 30 locations globally, is the largest independent engineering services company in the automotive sector. The group has annual sales of €700 million ($1.1 billion), comprising 80 percent from the automotive sector and 20 percent from the aerospace sector. Most of the aerospace work is for a European aircraft manufacturer. The global parent is a full-service supplier to the automotive industry, performing both product development for cars, and developing production equipment for manufacturing cars and trucks. Recent full-car projects include a midsize upper class vehicle for a German manufacturer and a station wagon variant for a French manufacturer. Similarly, the company undertakes product development for the aerospace industry. For some projects, a significant proportion of the work involves coordinating a number of contractors and managing the overall project, rather than doing a lot of the engineering in house.

The company entered the Australian market in 1999. Annual turnover is $20 million, which is about 2 percent of that of the global group. The local company does product development work in the automotive sector, and diversified into aerospace and defence work in 2006. Aerospace and defence work is now about 10 to 20 percent of turnover. The company expects this to grow to 50 percent of its work in two years due to a combination of declining automotive sector work, and increasing work in the other sectors. If the automotive sector work drops below 50 percent, it may not be viable to continue the Australian operations.

Work

EDAG works on all parts of the car except the chassis and drive train (for example, body panels, front bumpers, wheels, cockpits, etc.). The basic process involves an industrial designer giving EDAG a picture of what is wanted, and EDAG engineering it to make it ready to manufacture. For a bumper, for example, EDAG will start with a concept, and then engineer it so that it accommodates all the lights, has adequate airflow for the radiator, and provides adequate impact protection.

The company's second area of work is in the modernisation of military hardware. Currently this work is exclusively for the Australian army, though EDAG hopes to move into naval and air force work in the future, as it builds competence in working with the military. The army has many vehicles that are up to 40 years old that need to be fitted with new equipment. Because very few military vehicles are identical, the typical production run for one of these retrofit items is 20–40 units. This is about the same size as a typical production run for a prototype. Consequently, the company is well positioned to do this sort of work. Furthermore, for larger production runs (more than 100 units) it is relatively easy for EDAG to outsource the final production to another firm with a higher level of automation.

As noted, EDAG hopes to move into naval work, an industry that has retrofit work and also work engineering the installation of equipment onto new ships. The interface between that equipment and the ship also has to be engineered. EDAG sees an opportunity in naval work, but the local purchaser (the Defence Materiel Organisation) is reluctant to require the overseas prime supplier to use local capabilities. This is a major barrier to spillovers into this sector. Similar work is presumably available for the air force, though the existing suppliers in that sector are well set up to meet this need.

EDAG does two types of work in the aerospace sector. First, it does one-off design and engineering for VIP planes. For instance, VIP planes may have several fittings such as beds and LCD screens. The connections between those fittings and the airframes will need to be engineered to meet safety requirements, vibration needs, and so forth. Second, EDAG recently bought a business in Brisbane to do turnkey refurbishment of the interior systems of aeroplanes. The idea is to provide a one-stop

shop that can support several of the local airlines, and enable them to avoid having their own interior workshop. When a plane comes in for major mechanical maintenance, EDAG will pull out the entire interior at the same time, repaint it, and repair or replace all the equipment before putting it all back looking newer and fresher. Replacements and repairs of interior components often require specialist engineering and fabrication. The potential clients include small local airlines (such as Rex and SkyWest) as well as individual owners.

Knowledge spillovers

There are two ways in which knowledge spills over from automotive work to other work. The first is that there are some types of work that EDAG does in other sectors that is premised on its work in the automotive sector. That is, it could not do the work if it did not have the experience in the automotive sector. This is the case for all their work in its aerospace sector. Because this is a highly regulated and mature industry, EDAG's entry does not involve the introduction of new capabilities to that sector (unlike the military refurbishment example).

Second, EDAG was able to enter the military retrofit market because it has well-developed project management techniques that originate from work in the automotive sector. Because the automotive sector is so competitive, it has methodologies for designing, prototyping and refining products and for managing the project so as to ensure it meets the launch window, usually under cost. These are attributes that are attractive to defence procurement officers, since defence contractors have not previously had a strong time and cost focus. When persuading the military to adopt new project planning techniques, it makes a huge difference to be able to point to a local car manufacturer doing these things. EDAG is getting increasing amounts of defence work, which suggests that what it has to offer is valued.

Secondary knowledge spillovers and barriers to knowledge spillovers

There have been knowledge spillovers to EDAG's suppliers in the sense that the company has moved the suppliers into the defence and aerospace markets. EDAG is not aware of its work in the automotive sector leading its suppliers to develop new skills and capabilities that are used beyond the sector. However, that does not mean it is not occurring. The main barrier to the spillovers has been learning how to deal with the new industry sectors. In the aerospace sector, especially its refurbishment work, EDAG has needed to be more meticulous with its documentation and teach its engineers and tradespeople this discipline. EDAG has found entry into the defence sector difficult. In the early stages of its work in the sector, EDAG was in a joint venture with a company with extensive military experience. The difference in the mindsets of the engineers in the two industries was profound, and proved almost impossible to work around. Subsequently, EDAG abandoned the partnership. Similarly, procurement in the two industries is dramatically different. In the automotive sector, a $7 million contract will typically have a 20-page specification, and many of the other details will be transferred in computer-aided design files. In defence, a $150,000 contract may run to 150 pages. EDAG's engineers and tradespeople find it challenging to carefully read a 150-page contract in order to extract what is actually required of them. It has taken EDAG considerable time and effort to learn how to work with the military.

MARAND

Marand began its metal cutting and tool making in the automotive industry, working initially for Holden some 40 years ago. Director and owner Tony Ellul notes that "[t]he knowledge and expertise from car engine manufacturing has directly led and allowed us to compete and prosper in other industries recently, such as aerospace and rail".

Marand has developed and retains its 'precision capability', and that is part of what spills over into other industries and spurs growth. Marand develops proprietary knowledge, first and foremost in automotive, and then transfers this into other industries and activity streams. It has now matured to the point where spillovers are also flowing back into its automotive industry work from its newer businesses.

Spillovers

Rail industry spillover

Rail was the first example of a 'new' industry Marand entered based on its expertise developed in the automotive industry. Maintenance support of rolling stock is a substantial task, requiring large pieces of complex equipment. Marand created a subsidiary, Atlas Rail, which designs, manufactures and installs commissions such as maintenance systems. These systems of equipment used to be imported, leading to enormous economic value derived from import replacement. Marand has clients all over Australia,

including Queensland Rail, BHP Billiton, Rio Tinto and Fortescue, which are all operators of rail systems.

Tony Ellul notes, "Our ability to create the rail businesses came directly from our knowledge gained in automotive over the years". Rail customers are now wanting not just the hardware, but 'full turn-key solutions', and Marand is now using its knowledge gained from the auto sector to implement lean operations in maintenance for mining clients, which is another clear form of knowledge spillover. Atlas Rail has created jobs, value-added and localised what was previously imported expertise and equipment.

Marand has also sold these equipment and maintenance systems into passenger rail networks, for example in New South Wales. This business has also developed further by winning orders from light rail, and trams operator customers.

Aerospace spillover

Diversification was a deliberate business strategy for Marand, because the automotive industry in Australia is 'lumpy' for precision toolmaking companies. Marand took its capability to other industries such as aerospace, and in the past five years, Marand has become a Tier 1 supplier to Boeing in Australia. Tony Ellul has taken senior Boeing executives to visit Ford in Australia to clearly demonstrate first hand how smoothly work can flow, using equipment built by Marand. Marand now has contracts with the Joint Strike Fighter for maintenance equipment tools and systems. There is a multimillion system being used on the Joint Strike Fighter prototype. Marand is also now a Tier 1 supplier to Lockheed in the United States. Discussions are under way to lock in a long-term contract (until 2036). This would mean establishing facilities in the United States and Europe and becoming a global supplier, based on the expertise generated in the automotive sector that exists in its Moorabbin facility. Due to its success with the Joint Strike Fighter program, plans and discussions are under way for Marand to participate in two other programs in the aerospace sector including work:

- with and for Boeing, with assistance from the Office of Australian Industry Capability, which involves Marand exploring new developments; and
- with EADS (Airbus and Eurocopter), which is developing a similar program of working with a global corporate procurement team to build opportunity.

According to Tony Ellul, "[a]ll this was based on automotive derived capability". Ten years ago Marand was an 85 percent automotive sector supplier. This reduced to 45 percent in 2008, due to spillovers and growth in other industries.

People and training

Marand has an apprentice program, and knowledge spillover occurs when some of these apprentices eventually leave and set up businesses elsewhere. Holmesglen TAFE teachers have been stationed at Marand to learn and develop courses.

Marand also has agencies it operates for imported equipment, in which knowledge gained from automotive work is applied to other industries, including food, plastics, construction, building materials, timber, and robotics applications elsewhere, all based on the automotive core. As an agent of foreign manufacturers, Marand has used its experience with that equipment gained from the automotive sector, to then find applications and sales and service contracts in those other industries. In other words, just as Marand spills over its application of proprietary knowledge on the products that it designs and produces in house and through its supply network, so too does it work this way in (spillovers from) third-party equipment made overseas.

Marand points out that it is because of the small automotive industry in Australia that firms such as Marand must diversify to survive and prosper. A large automotive industry such as Japan's allows firms to grow and be robust just by supplying automotive customers, but this is not the case for Australia. Marand frequently uses subcontractors, and it claims that the skills and knowledge that it passes on to its many subcontractors also 'spillover' into other sectors.

A recent spillover at Marand is project management and program management knowledge, which was first gained in the automotive sector. Marand can and does now work in other industries using this expertise. This skill allows it to move from Tier 1 status in the automotive sector to become Tier 1 in the Joint Strike Fighter program, and other similar projects. It also gives Marand the program management capability to build Tier 2 networks in aerospace as it had learned to do in the automotive sector.

Benefits from spillovers

These spillovers have been an integral part of a story of growth and profit for Marand. In the past 10

years the company has grown from 75 people and $8.5 million turnover with no exports and 85 percent automotive industry work, to be much larger and stronger. It first became a Tier 1 supplier to Ford. As a system integrator, Marand produced total turn-key design and integration for Ford, Barra, Orion and Territory models in recent years. By 2007 Marand had 195 employees, with $50 million turnover of which 45 percent is automotive related. Marand's exports are 25 percent of its business and growing. It is also a profitable business.

This strong performance has come from a change of strategy in the past decade, from an internal focus to a wider network of Tier 2 and 3 supply chain partners supplying various Marand customers. This is another form of spillover, to create, build and strengthen other companies up the supply chain, through auto and other work. Marand helps these partners in win-win relationships, through knowledge and skills gained by the company. About 100 people in other companies are working directly on Marand contracts.

In summary, spillovers at Marand have been a key source of growth, such that 70 percent of its business services and products come from new offerings that it did not have when it was a pure automotive industry supplier a decade ago. This has been based on core capabilities of flexibility and innovation.

OZPRESS

OzPress commenced operation as K&K Fasteners in 1970 in a converted parachute-drying hut at the Ballarat airport. During the early 1970s the business expanded and spread into an adjoining aircraft hangar, which housed the industrial metal presses. The demands of international competitiveness saw the business relocate in 1989 to the current facility at the Wendouree Industrial Estate. Through the mid-2000s, the company was in two lines of business – pressings and wiring looms for trucks. The business grew, but OzPress started to lose the wiring loom work (presumably to overseas competitors). After a change in the ownership structure in 2005, it started to trade as OzPress Pty Ltd and moved exclusively to pressing, welding and small assemblies. The company currently employs 29 people, of whom 23 work in production.

Clients

The company has four major clients and a number of minor ones. Fifty-six percent of its work is directly for Toyota (that is, as a Tier 1 supplier). It has been with Toyota ever since Toyota started producing in Australia.

Fifteen percent of OzPress's work is for Dana Pty Ltd, and 9 percent is for Cooper Standard (Australia) Pty Ltd. Dana produces drivetrain subassemblies (that is, axles, differentials, suspension modules), and Cooper Standard manufactures vehicle components, particularly lubrication systems, noise control and vibration systems, and other body and chassis products. For these companies, OzPress provides pressings that are then incorporated into larger assemblies. Dana, Cooper Standard, and other sub-assembly manufacturers have pressing operations of their own. OzPress hopes to expand its business by taking this work over from them, so they can focus on assembly.

Fourteen percent of OzPress's work is for Victa Lawncare Products, principally making parts for lawnmowers. Victa used to press its own parts in house, and then decided, in about 1999, to outsource the work. OzPress received contracts for a number of the small parts, while the larger parts went to other manufacturers, such as G&A.L. Harrington. As with the automotive work, most of OzPress's work is on pressings and small welded assemblies (for example, a single nut welded on a pressed plate). Most of OzPress's work is for high-end machines (such as ride-on mowers).

The remaining 6 percent of the work falls into two groups. A big part of it is parts and accessories, generally for the automotive industry. Typically this involves pressing a small number of units of a part that the company has pressed in the past – for a vehicle model that is not manufactured anymore. The remainder is small runs for some niche clients such as Hella (vehicle lights) and Stratco (footing plates for outdoor pergolas). The company is also looking to expand into other industries, particularly parts for minerals processing equipment.

Work process

A typical job will begin when OzPress is contracted by a client to manufacture a part. The client will provide OzPress with a drawing and a specification. OzPress will then approach a toolmaker (its current toolmaker is in China), who will make a tool that can be used to manufacture the part. That tool will be the property of the client, not OzPress. However, OzPress will be retained to use that tool to stamp out the designated part for as long as the client wants (generally for the life of the product).

The company generally wins contracts for one or two new parts each year. In a recent Ford model, the company was asked to produce four different parts for supply to Cooper Standard. The company produces over 30 parts for the current Toyota Camry and Aurion.

Knowledge spillovers

One of the main knowledge spillovers is from the automotive work to the work for Victa. In the narrow sense, all the work for Victa is predicated on automotive work, in that they use the same basic technology for both industries, and were in the automotive sector first. Without the automotive work, the company would not be viable.

More broadly, the company's relationship with Toyota has meant that its quality and efficiency are constantly improving. It applies the same efficiency and quality improvement techniques to its Victa work, and in so doing, reduces cost and increases quality there too. OzPress uses the Toyota procedures for the Victa work for two reasons. First, it means it has lower cost and higher quality. Second, it means OzPress has consistency in operations and management throughout the company.

One area where OzPress has improved dramatically is in the commissioning of new parts. In the past, OzPress would be sent a design from the toolmaker, in order to make some trial parts. If the parts were out of specification, OzPress would tinker with the tool until they were within specification, and then it would accept that tool and begin production. Such a tool, however, would be 'buggy'. That is, it would have defects which meant that it generated difficulties in manufacturing or the occasional out-of-specification part.

In contrast, in the Toyota system the project is managed more carefully and systematically, from concept design, to tooling, to the procedure for running the new tool. Every tool goes through three testing (and modification) phases to make sure it is right, including running it at the full production rate for a period. Consequently, when the part goes into scale production, it can reliably produce to the specification for long periods of time. These skills gained from the Toyota production system have given OzPress the necessary capability to make high-quality tools from concept to production. These skills can be applied in other non-automotive sectors in which OzPress operates.

More generally, Toyota gives OzPress cost and quality targets and then teaches it tools and techniques to meet them. Those tools and techniques are spread throughout the business.

A third domain for knowledge spillovers is through their suppliers. The company's main suppliers are Toyota Tsusho (steel and nuts), Excellent Plating and Alliance Electroplaters (painting and coating), Coldforge Products (rivets and bolts), and its toolmaker. With the exception of Alliance Electroplaters, Toyota does not interact with the suppliers. Rather, it simply expects OzPress to ensure that its standards are met. The effect, however, is that OzPress teaches its suppliers about the Toyota production system. In the case of Alliance, Toyota is very concerned about environmental emissions from electroplaters, and so it has an ongoing accreditation program, even though it is a second-tier supplier.

Another domain for knowledge spillovers is through plant visits from other companies. They have one or two a year. For example, in 2008 a group of 17 people from the Tasmanian Food Association came through, brought by the Tasmanian Government and the Victorian Innovation Insights program. Visitors included representations from a potato chip manufacturer and an abattoir. OzPress was able to demonstrate the skills that Toyota has taught so the visitors could get ideas for their own plants. In 2007, it had a group through as part of manufacturing week.

The company has joined a benchmarking group that principally involves mining suppliers. The group aims to travels overseas to look at other companies and facilitate knowledge transfer between participants on those trips.

THE UNIVERSITY OF MELBOURNE DEPARTMENT OF MECHANICAL ENGINEERING

The principal interviewee for this case study was Dr Michael Brear, who is a senior lecturer in the Department of Mechanical Engineering, where he is involved in teaching, researching, and consulting in the areas of thermodynamics and fluid mechanics. The department undertakes a range of consultancy work for the automotive and other manufacturing industries. Another group in the department also does research within the automotive sector, focusing on the dynamics of mechanical systems. In particular, they have done a lot of work on automotive braking. More generally, the department has depth in the traditional areas of mechanical engineering including

dynamics, fluid mechanics and design. It does not have much depth in production engineering, industrial engineering and supply chain management.

Spillovers from the Department of Mechanical Engineering occur on three levels. At the first, the department teaches students fundamental analytic capabilities that are independent of the domain of study. For example, undergraduate students learn how to analyse problems systematically. Postgraduate students learn how to design, carry out, and write up experiments. At the second level, there are spillovers within the specific domain of study. That is, the basic engineering principles of thermodynamics and fluid mechanics are fundamentally built from the laws of physics. Those principles find use outside the automotive sector. At the third level, there are particular technical artefacts and techniques produced for the auto sector that have application in other domains.

Level 1 spillovers – spillovers of generic engineering skills

These spillovers arise because the automotive industry provides a useful context for studying thermodynamics and fluid mechanics. The theory is generic to mechanical engineering, and so is no more specific to the automotive sector than to any other sector that might inform the work of the department. However, the fact that there is a local automotive sector means that the faculty are able to make the theory meaningful for students in many ways – particularly by bringing in examples from their research and consulting, and by holding up the carrot of possible employment. Further, the local original equipment manufacturers take on undergraduate students for so-called 'co-op' years in which students take a year out from their studies and work full time within the company with equivalent responsibilities as graduates. This program has proven very successful educationally for the students and universities. The important things students learn are generic skills. They take them with them wherever they get work. For example, many students go to work in banking and financial services or management consulting in addition to traditional engineering disciplines.

Level 2 spillovers – spillovers of thermodynamics and fluid mechanics

Because of the strong research and consulting links to the automotive sector, the sector informs both undergraduate and graduate training in thermodynamics and fluid dynamics (in the case of the interviewee's research group) and dynamics of machines (in the case of the other research group). The faculty and students then develop expertise in thermodynamics and fluid mechanics (or dynamics of machines) and can apply them to any engineering problem that is relevant.

For example, the group that does research on automotive braking has recently been consulting to and researching with precision machine tool manufacturers. The facilities and capabilities developed by the group while undertaking automotive research and consulting has been enabling its research and consulting to these other industries.

Similarly, the basic principles of fluid mechanics and thermodynamics are of fundamental importance to all aspects of combustion. As such, students of thermodynamics and fluid mechanics can apply what they learn to power generation technologies such as gas turbines, boilers, wind turbines and solar collectors. Similarly, they can use this learning in all aspects of transportation including internal combustion engine design (petrol, diesel, hydrogen, natural gas), jet engine design and hybrid power systems. So, for example, recent consulting clients of the department have included a manufacturer of small jet engines, a truck manufacturer, and chemical engineers who wanted to make gasoline from methane, and wanted to generate electricity from the process.

These spillovers also take a much more concrete form, as spillovers of specific technologies within the research laboratory. In particular, the software or hardware tools might be developed or purchased for automotive work, and then used in research for other areas of applied thermodynamics and fluid mechanics such as gas turbines.

Level 3 spillovers – specific artefacts

These spillovers involve the creation of specific artefacts within the automotive sector, and then their application to other sectors. They fall into two subcategories. The first group involves domains in which the basic engineering disciplines apply, but in which the automotive sector is ahead of other sectors. For example, automotive engine designers, who are trained by the university, can apply their extensive experience of making products cheaply and reliably into sectors such as aerospace, where traditionally the engineering is more focused on device performance rather than device performance for a given cost. Just as road vehicles are becoming more technologically advanced, so too are aircraft being forced to become cheaper and lighter because

of competition, and the spillover between these industries is often two-way. In as far as another sector finds there is need for these capabilities, then knowledge can be expected to spill over from the automotive sector to the other sector.

The second group involves the transfer of specific artefacts from the automotive sector to other sectors. For example, because of the competitive pressure, and the amount of engineering effort that goes into their design, automotive engines are very well engineered and very efficient. Certain Australian-built engines, while too heavy to enable lower fuel consumption for passenger vehicles (because they have cast iron blocks) are nonetheless very efficient, and therefore have many potential applications as a stationary power source. As such, they potentially have enormous use as stationary engines outside of vehicles. An automotive engine can be reconfigured to produce about 30 kilowatts of power very efficiently; more efficiently than, say, gas turbines. This particular spillover has not occurred extensively in the past because vehicle manufacturers generally build their engines only for use in cars, and minimisation of greenhouse gas emissions is only now becoming a strong business incentive.

There are a number of applications in which these engines are either used or could be used. For example, instead of running its air-conditioners electrically, a hospital might use an automotive engine (running natural gas or LPG as the fuel) to run the compressors in its air-conditioning system. It could then capture the heat from the engine exhaust, and use that to boil water and so raise steam for heating or its laundry. This approach to air-conditioning generates much lower levels of greenhouse gases than using centralised power from coal-fired power stations, and more generally is referred to as 'cogeneration'. Indeed, cogeneration is already being used extensively in Europe and the United States to achieve large reductions in carbon emissions from such applications.

The potential spillover is enormous. Five percent of the electricity used in the industrial world is used to compress air. Ten to 20 percent of Australia's greenhouse gas emissions come from heating, ventilation and air-conditioning systems.

APPENDIX G: COMPARATIVE IN-SERVICE EMISSIONS TESTING

VEHICLES

Ford Falcon AU 2001 station sedan bi-fuel retrofit venturi gas system.

Odometer 95,000 kilometres.

Holden VS Acclaim 1996 sedan bi-fuel retrofit venturi gas system.

Odometer 215,000 kilometres.

Test cycle Euro 3 in both cases (ADR 79/01 Type 1 test).

Fuel commercially available.

Mechanical tune: basic check for original specification and fuel functionality and original exhaust catalyst still retained. Test performed in June 2008 using a National Association of Testing Authorities laboratory.

Table G.1 Comparative in-service emissions test using ADR 79/01 cycle, ULP vs LPG

Ford Falcon AU Futura wagon 4.0L SCT 269 odo 95,154					
FUEL	**HC: g/km**	**CO: g/km**	**CO_2: g/km**	**NO_x: g/km**	**Combined cycle L/100 km**
ULP	0.479	2.606	270.9	1.509	11.54
LPG	0.173	0.994	240.95	1.29	14.89
Holden vs Acclaim sedan 3.8L PDT 166 odo 213,942					
ULP	0.525	4.216	278.77	2.365	12.46
LPG	0.479	6.724	247.63	1.658	15.91

Notes:

All fuels used were from the retail sector (standard pump fuels).

Both the 2001 AU Falcon and 1996 VS Commodore were fitted with standard fumigation systems, Parnell/IMPCO.

To achieve a direct comparison the latest ADR 79/01 test method was used (Euro 3 level).

When reviewing the results, both vehicles passed their relevant ADR requirement for their date of manufacture but failed current 79/01.

The CO_2 gains were both over 10%.

Important to note the kilometres of both vehicles highlighting the benefits of older installations being installed.

Both vehicles have their original catalytic converters.

No optimisation was carried out on either vehicle prior to the test. Both vehicles had mechanical inspections ensuring both fuel selection and vehicle/engine performed satisfactorily.

Source: LPG Australia.

APPENDIX H:
GOVERNMENT FLEET PURCHASING ARRANGEMENTS

	Prefer Aust. made?	Target and date	8-cylinder	6-cylinder	4-cylinder	LPG	Hybrid	Other	Comment
Australian Government	Yes	Increase proportion of fleet vehicles with scores in top half of the Green Vehicle Guide (GVG) (10.5 or greater) from 18% to 28%							
Queensland		Annual emissions from QFleet will be reduced by: 15% by end of 2010 25% by end of 2012 50% by end of 2017 Referred to a 30/6/2007 benchmark. Minimum 5.5 GVG greenhouse rating for passenger vehicles. Minimum 3.5 rating for light commercial							Choice of vehicle based on emissions rather than number of cylinders. Proportion of diesel, hybrid, microlight and small vehicles in passenger fleet to increase by 50% 80% of light commercial fleet will use diesel or LPG. Petrol vehicles to use E10 when available.
New South Wales		Each agency to achieve an average score for its vehicles of 12/20 by end of 2007–08. 20% reduction in emissions by 30 June 2008 (2004–05 baseline)	No, except in specific cases				At least 1% of agency fleet to be hybrid		E10 to be used where available
ACT		10% fleet will comprise fuel efficient, low emissions vehicles (four star or higher in GVG) by 2008.	No	Phasing out, unless required for specific cases	Preferred		Has small fleet		

	Prefer Aust. made?	Target and date	8-cylinder	6-cylinder	4-cylinder	LPG	Hybrid	Other	Comment
Victoria	Yes				Required for >30,000 km/year	Required for >30,000 km/ year.	Committed to a fleet of 150 hybrid vehicles		
Tasmania		All passenger vehicles to meet GVG Greenhouse rating of 5.5 or better by 2010. All light commercial and 4WD vehicles must meet rating of 3.5 or better by 2010.							
South Australia	Yes	SA Tackling Climate Change Strategy states that the SA Government will *"reduce emissions from the government vehicle fleet by converting 50% of state government cars to lower emission fuels by 2010; and reduce emissions generated by government travel by applying greenhouse friendly corporate travel policies for the location of government workplaces, commuting, aircraft and taxi use, and vehicle salary packaging."* The Climate Change and Greenhouse Emissions Reduction Act 2007 also sets a South Australian target *"to reduce by 31 December 2050 greenhouse gas emissions within the State by at least 60% to an amount that is equal to or less than 40% of 1990 levels as part of a national and international response to climate change"*.				37% of passenger and light commercial vehicles operate on lower-emissions fuels	Has small fleet of hybrids		Lower emission fuels include conventional fuels used in efficient power trains such as hybrid vehicles and high efficiency common rail diesel engines.
Western Australia			No	Allowed for specific cases	Preferred	25% of 6-cyclinder vehicles to be on LPG	Will purchase hybrid fleet	Will use alternative fuels in fleet	New strategy being developed.
Northern Territory		Reduce emissions from government passenger fleet by 5% per kilometre travelled by June 2007 (2003–04 levels)							

APPENDIX I:
STATE AND TERRITORY STAMP DUTIES AND REGISTRATION FEES – INDICATIVE EXAMPLES

Jurisdiction	Stamp duty arrangement	Stamp duty amount	Initial registration (one year)	CTP insurance	Total cost (est.)
New South Wales	3% of the new car price including GST up to $45,000 and 5% for any amount that is over $45,000	$900.00	$303.00	$334.00	$1,537.00
Australian Capital Territory	3% of the new car price including GST up to $45,000 and 5% of each dollar over $45,000	$900.00	$264.50	$386.75	$1,551.25
Victoria	2.5% of the new car price up to $35,000 – 4% of the total new car price when between $35,000 and $45,000 and 5% of the total new car price when over $45,000	$750.00	$172.80	$391.60	$1,314.40
Western Australia	2.75% of the new car price up to $15,000 – a sliding scale between $15,000 and $40,000 from 2.75% to 6.5%, and 6.5% for every dollar over $40,000	$1,275.00	$259.60	$225.23	$1,759.83
Tasmania	3% of the new car purchase price up to $35,000, 11% for every dollar between $35,000 and $45,000 and 4% for every dollar over $45,000	$900.00	$230.45	$338.00	$1,468.45
Queensland	2% of the purchase price for hybrids, 3% for 4 cylinder vehicles, 3.5 for 6 cylinder vehicles and 4% for V8s and above	$900.00	$272.05	$285.20	$1,457.25
Queensland (based on a new $30,000 Toyota Camry Hybrid)	2% of the purchase price for hybrids	$600.00	$163.95	$285.20	$1,049.15
Northern Territory	3% of the new car price including GST	$900.00	n/a	$426.30	$1,326.30
South Australia	$60 for the first $3,000 of the new car purchase price, and 4% of the total dollar amount exceeding the $3,000	$1,140.00	$113.00	$371.00	$1,624.00
National average		$958.13	$230.77	$344.76	$1,533.66

Notes:

Table based on a new $30,000 passenger motor vehicle, 4-cylinder, under 1.5 tonnes, and purchased for non-commercial purposes.

Insurance premiums were provided by the relevant authority in each state or territory and are based on a new Commodore, garaged in the capital city, with a driver aged 40 years as at 1 October, 2006.

Initial registration includes mandatory costs such as transaction fees, vehicle inspections and licence plates.

APPENDIX J:
KEY AUTOMOTIVE STATISTICS

This Appendix contains extracts from Key Automotive Statistics, published annually by the Department of Innovation, Industry, Science and Research. It can be viewed at www.innovation.gov.au/Industry/Automotive/Pages/AutomotiveIndustry.aspx.

MOTOR VEHICLE SALES IN AUSTRALIA

Table J.1. New motor vehicle sales in Australia, 1994 to 2007

Year	Passenger		Light trucks/ SUVs		Heavy trucks		Total	
	Units	(%)	Units	(%)	Units	(%)	Units	(%)
1994	460,698	74.8	137,252	22.3	18,336	3.0	616,286	100
1995	488,372	76.0	136,449	21.2	17,736	2.8	642,557	100
1996	492,058	75.7	142,830	22.0	15,161	2.3	650,049	100
1997	540,353	74.8	165,711	22.9	16,578	2.3	722,642	100
1998	584,360	72.4	203,941	25.3	19,368	2.4	807,669	100
1999	547,575	69.6	218,848	27.8	20,422	2.6	786,845	100
2000	553,673	70.3	213,571	27.1	19,856	2.5	787,100	100
2001	529,452	68.5	224,270	29.0	18,959	2.5	772,681	100
2002	540,240	65.5	262,937	31.9	21,132	2.6	824,309	100
2003	588,511	64.7	297,167	32.7	24,133	2.7	909,811	100
2004	589,985	61.8	336,763	35.3	28,481	3.0	955,229	100
2005	608,804	61.6	348,170	35.2	31,295	3.2	988,269	100
2006	598,394	62.2	332,638	34.6	31,634	3.3	962,666	100
2007	637,019	60.7	375,732	35.8	37,231	3.5	1,049,982	100

Source: VFACTS, retail sales

Table J.2. Total market share, by marque in Australia, 1994 to 2007

Marque	Market share (%)													
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Toyota	20.6	18.8	18.6	17.4	19.6	19.5	20.2	18.3	19.2	20.5	21.1	20.5	22.2	22.5
Holden	18.8	19.2	19.2	16.6	19	19.7	19.7	21.4	21.6	19.3	18.6	17.7	15.2	14
Ford	20.3	21.5	20.3	18	15.9	16.1	14.5	13.8	13.2	13.9	14.2	13.1	11.9	10.3
Mazda	5	4.4	4.1	4.3	3.4	3.4	3.5	4.4	4.7	5.8	5.8	6.7	6.6	7.4
Mitsubishi	12.2	10.1	9.4	11.4	10.4	8.9	9.3	8.8	8.2	8	6	5.8	5.6	6.2
Honda	2.6	2.2	2.5	2.4	3.2	3.6	3.8	2.7	2.9	3.4	3.8	4.8	5.6	5.8
Nissan	4.1	3.7	3.9	4.5	5.7	6.2	5.8	5.6	6.1	6.4	6.7	5.7	5.5	5.7
Hyundai	4	5.4	7.5	8.3	7.1	6	5.8	5.2	4.1	3.4	4.5	4.9	4.8	4.8
Subaru	1.4	1.2	1.3	2	2.5	3.2	3.4	3.5	3.4	3.3	3.5	3.6	3.9	3.7
Other	11	13.5	13.2	15.1	13.2	13.4	14	16.3	16.6	16	15.8	17.3	18.7	19.6
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: VFACTS, retail sales

Table J.3. Sales volume and market share in Australia, by market segment, 2000 to 2007

	2000		2001		2002		2003		2004		2005		2006		2007	
Model line	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**
Passenger																
Light	89,977	11.4	66,942	8.7	66,235	8	76,716	8.4	83,944	8.8	95,890	9.7	116,086	12.1	127,891	12.2
Small	154,050	19.6	162,046	21	164,943	20	175,651	19.3	181,160	19	218,013	22.1	219,358	22.8	232,388	22.1
Medium	40,628	5.2	37,387	4.8	38,951	4.7	47,164	5.2	49,983	5.2	86,234	8.7	87,624	9.1	92,579	8.8
Large	198,766	25.3	190,303	24.6	188,348	22.8	203,524	22.4	181,678	19	167,381	16.9	136,606	14.2	139,677	13.3
Upper large											6,823	0.7	7,334	0.8	9,346	0.9
People movers	11,736	1.5	12,140	1.6	12,791	1.6	11,852	1.3	15,232	1.6	15,738	1.6	15,442	1.6	16,202	1.5
Sports	9,544	1.2	8,820	1.1	13,988	1.7	10,175	1.1	8,903	0.9	18,725	1.9	15,944	1.7	18,936	1.8
Prestige	29,590	3.8	22,773	2.9	24,830	3	29,167	3.2	37,079	3.9						
Luxury	19,382	2.5	29,041	3.8	30,154	3.7	34,262	3.8	32,006	3.4						
Total passenger	553,673	70.3	529,452	68.5	540,240	65.5	588,551	64.7	589,985	61.8	608,804	61.6	598,394	62.2	637,019	60.7
Light trucks																
Light buses	1,619	0.2	1,277	0.2	1,615	0.2	1,787	0.2	1,544	0.2	2,298	0.2	2,622	0.3	2,465	0.2
Vans	19,006	2.4	16,870	2.2	18,270	2.2	21,598	2.4	22,387	2.3	21,571	2.2	20,453	2.1	20,300	1.9
SUVs	105,510	13.4	116,236	15	138,064	16.7	150,578	16.6	173,087	18.1	180,292	18.2	170,847	17.7	198,176	18.9
PU/CC 4X2	47,276	6	53,817	7	59,516	7.2	70,966	7.8	79,298	8.3	79,534	8	69,545	7.2	70,606	6.7
PU/CC 4X4	39,533	5	35,371	4.6	42,039	5.1	50,670	5.6	58,692	6.1	62,728	6.3	67,639	7	82,691	7.9
Trucks 2,500-3,500 kgs GVM	627	0.1	699	0.1	953	0.1	1,568	0.2	1,755	0.2	1,747	0.2	1,532	0.2	1,494	0.1
Total light trucks	**213,571**	**27.1**	**224,270**	**29**	**260,457**	**31.6**	**297,167**	**32.7**	**336,763**	**35.3**	**348,170**	**35.2**	**332,638**	**34.6**	**375,732**	**35.8**
Heavy trucks																
Trucks 3,501-7,500 kgs GVM	7,705	1	7,598	1	10,569	1.3	8,480	0.9	9,585	1	11,191	1.1	11,488	1.2	12,579	1.2
Trucks 7,501-15,000 kgs GVM	5,163	0.7	3,892	0.5	4,365	0.5	4,837	0.5	5,947	0.6	6,992	0.7	7,116	0.7	8,357	0.8
Trucks 15,001+ kgs GVM	5,863	0.7	6,723	0.9	8,063	1	10,227	1.1	12,132	1.3	12,274	1.2	12,292	1.3	15,370	1.5
Buses	1,125	0.1	746	0.1	615	0.1	589	0.1	817	0.1	838	0.1	738	0.1	925	0.1
Total heavy trucks	19,856	2.5	18,959	2.5	23,612	2.9	24,133	2.7	28,481	3	31,295	3.2	31,634	3.3	37,231	3.5
TOTAL VEHICLES	787,100	100	772,681	100	824,309	100	909,811	100	955,229	100	988,269	100	962,666	100	1,049,982	100.0

Note: From 2005, prestige and luxury cars are merged into other categories. Also, from 2005 there is a new category for 'upper large' cars.

Source: VFACTS, vehicle retail sales

Table J.4. Sales volumes and segment shares of locally produced and imported passenger motor vehicles, by market segment, 2000 to 2007[a]

	2000		2001		2002		2003		2004		2005		2006		2007	
Model line	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**
Light and small segments																
Locally produced	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Imports	244,027	44.1	228,988	43.3	231,178	42.8	252,367	42.9	265,104	44.9	313,903	51.6	335,444	56.1	360,279	56.6
Total light/small	244,027	44.1	228,988	43.3	231,178	42.8	252,367	42.9	265,104	44.9	313,903	51.6	335,444	56.1	360,279	56.6
Medium segment																
Camry 4 (inc. the Apollo 4)	19,644	3.5	18,256	3.4	20,536	3.8	25,261	4.3	26,286	4.5	24,446	4	24,221	4	26,336	4.1
Locally produced	25,132	4.5	18,256	3.4	20,536	3.8	25,261	4.3	26,286	4.5	24,446	4	24,221	4	26,336	4.1
Imports	15,496	2.8	20,037	3.8	18,415	3.4	21,903	3.7	23,697	4	61,788	10.1	63,403	10.6	66,243	10.4
Total medium	40,628	7.3	38,293	7.2	38,951	7.2	47,164	8	49,983	8.5	86,234	14.2	87,624	14.6	92,579	14.5
Large segment																
Commodore (inc. Lexcen)	83,610	15.1	85,246	16.1	88,478	16.4	86,553	14.7	79,170	13.4	66,794	11	56,531	9.4	57,307	9.0
Falcon, Fairmont	60,460	10.9	53,534	10.1	54,629	10.1	73,220	12.4	65,384	11.1	53,080	8.7	42,390	7.1	33,941	5.3
Camry 6, Vienta (inc. Apollo 6)	22,449	4.1	20,230	3.8	19,004	3.5	19,343	3.3	19,654	3.3	14,995	2.5	9,431	1.6	22,044	3.5
Avalon, Aurion																
Magna 6, Verada, 380	26,271	4.7	24,381	4.6	23,405	4.3	23,666	4	15,968	2.7	16,017	2.6	13,065	2.2	10,948	1.7
Locally produced	192,790	34.8	183,391	34.6	185,516	34.3	202,782	34.5	180,176	30.5	150,886	24.8	121,417	20.3	124,240	19.5
Imports	5,976	1.1	6,736	1.3	2,832	0.5	742	0.1	1,502	0.3	16,495	2.7	15,189	2.5	15,437	2.4
Total large	198,766	35.9	190,127	35.9	188,348	34.9	203,524	34.6	181,678	30.8	167,381	27.5	136,606	22.8	139,677	21.9
Other segments[b]																
Statesman, Caprice	6,370	1.2	5,518	1	4,958	0.9	5,424	0.9	4,651	0.8	3,573	0.6	3,076	0.5	4,754	0.7
Monaro[c]	0	0	176	0	4,274	0.8	2,889	0.5	2,656	0.5	2,834	0.5	912	0.2	152	0.0
Fairlane/LTD	3,076	0.6	2,455	0.5	2,101	0.4	2,535	0.4	2,190	0.4	1,980	0.3	1,158	0.2	1,780	0.3
Locally produced	9,446	1.7	8,149	1.5	11,333	2.1	10,848	1.8	9,497	1.6	8,387	1.4	5,146	0.9	6,686	1.0
Imports	60,806	11	63,895	12.1	70,430	13	74,608	12.7	83,723	14.2	32,899	5.4	33,574	5.6	37,798	5.9
Total other	70,252	12.7	72,044	13.6	81,763	15.1	85,456	14.5	93,220	15.8	41,286	6.8	38,720	6.5	44,484	7.0
Total PMVs																
Total locally produced	227,368	41.1	209,796	39.6	217,385	40.2	238,891	40.6	215,959	36.6	183,719	30.2	150,784	25.2	157,262	24.7
Total imports	326,305	58.9	319,656	60.4	322,855	59.8	349,620	59.4	374,026	63.4	425,085	69.8	447,610	74.8	479,757	75.3
TOTAL	553,673	100.0	529,452	100.0	540,240	100.0	588,511	100	589,985	100.0	608,804	100.0	598,394	100.0	637,019	100.0

Note:
a. Figures from 2005 onwards include changes of classifications.
b. Comprises upper large, people movers, sports, prestige and luxury vehicles.
c. Local production of the Holden Monaro commenced in 2001.

Source: VFACTS, Vehicle retail sales

Table J.5. New passenger motor vehicle sales volumes and market shares in Australia, by vehicle and purchaser type, 2000 to 2007

	2000		2001		2002		2003		2004		2005		2006		2007	
Segment	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**
Fleet PMV sales[a]																
Small segment[b]	53,609	9.7	64,978	12.3	76,174	14.1	74,234	12.6	78,072	13.2	89,647	14.7	105,484	17.6	116,054	18.2
Medium segment	20,041	3.6	17,606	3.3	14,531	2.7	19,547	3.3	22,060	3.7	22,671	3.7	40,912	6.8	45,556	7.2
Large segment	150,769	27.2	144,924	27.4	144,099	26.7	159,346	27.1	144,964	24.6	126,712	20.8	104,871	17.5	101,521	15.9
Other[c]	30,632	5.5	34,236	6.5	39,277	7.3	40,531	6.9	42,314	7.2	40,124	6.6	17,020	2.8	21,851	3.4
Total fleet PMV sales	255,051	46.1	261,744	49.4	274,081	50.7	293,658	49.9	287,410	48.7	279,154	45.9	268,287	44.8	284,982	44.7
Private PMV sales																
Small segment	190,418	34.4	164,010	31	155,004	28.7	178,133	30.3	187,032	31.7	216,408	35.5	229,960	38.4	244,225	38.3
Medium segment	20,587	3.7	20,687	3.9	24,420	4.5	27,617	4.7	27,923	4.7	29,162	4.8	46,712	7.8	47,023	7.4
Large segment	47,997	8.7	45,379	8.6	44,249	8.2	44,178	7.5	36,714	6.2	26,532	4.4	31,735	5.3	38,156	10.8
Other	39,620	7.2	37,632	7.1	42,486	7.9	44,925	7.6	50,906	8.6	57,548	9.5	21,700	3.6	22,633	3.6
Total private PMV sales	298,622	53.9	267,708	50.6	266,159	49.3	294,853	50.1	302,575	51.3	329,650	54.1	330,107	55.2	352,037	55.3
Total PMV sales	553,673	100	529,452	100	540,240	100	588,511	100	589,985	100	608,804	100	598,394	100	637,019	100

Note:
a. Includes sales to private businesses and government.
b. Small segment includes light and small vehicles.
c. Other group comprises people movers, sports, prestige and luxury vehicles.

Source: VFACTS, vehicle retail sales

Table J.6. SUV, light truck and heavy truck sales volumes and market shares in Australia, by marque, 2003 to 2007

Marque	2003		2004		2005		2006		2007	
	Units	Share (%)	Units	Share (%)	Units	Share (%)	Units	Share (%)	Units	Share (%)
Toyota	83,765	26.1	93,510	25.6	92,579	24.4	99,072	27.2	102,324	24.8
Ford	37,103	11.5	51,100	14	58,149	15.3	47,966	13.2	48,794	11.8
Nissan	37,364	11.6	38,818	10.6	35,929	9.5	39,890	11	45,225	11.0
Holden	42,852	13.3	53,172	14.6	51,634	13.6	38,119	10.5	41,832	10.1
Mitsubishi	23,887	7.4	24,062	6.6	28,520	7.5	26,471	7.3	37,277	9.0
Subaru	17,167	5.3	18,510	5.1	18,424	4.9	19,447	5.3	19,967	4.8
Mazda	13,085	4.1	12,546	3.4	11,436	3	10,085	2.8	19,781	4.8
Honda	10,685	3.3	9,450	2.6	9,673	2.5	10,627	2.9	12,646	3.1
Other	55,392	17.4	64,076	17.5	73,121	19.3	72,595	19.9	85,117	20.6
TOTAL	321,300	100	365,244	100	379,465	100	364,272	100	412,963	100.0

Source: VFACTS, vehicle retail sales

Table J.7. SUV and truck sales volumes and segment shares in Australia, by model, 2001 to 2007

	2001		2002		2003		2004		2005		2006		2007	
Model line	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**
SUVs and light trucks														
Ford Territory[a]	0	0	0	0	0	0	13,583	4	23,454	6.7	18,364	5.5	17,290	4.6
Ford Falcon utility[a]	16,955	7.6	17,883	6.9	20,212	6.8	20,123	6	18,384	5.3	15,858	4.8	13,758	3.7
Holden Adventra[a]	0	0	0	0	0	0	2,500	0.7	3,153	0.9	2,543	0.8	655	0.2
Holden utility 4x2[a]	11,173	5	13,791	5.3	17,211	5.8	20,813	6.2	18,877	5.4	13,377	4	11,511	3.1
Holden utility 4x4[a]	0	0	0	0	0	0	1,559	0.5	1,325	0.4	697	0.2	9	0.0
Other	196,142	87.5	228,783	87.8	259,744	87.4	278,185	82.6	282,977	81.3	281,799	84.7	332,509	88.5
Total light trucks	224,270	100	260,457	100	297,167	100	336,763	100	348,170	100	332,638	100	375,732	100.0
Heavy trucks														
3.501 – 7.5 tonnes														
Mitsubishi Canter[b]	1,322	17.4	1,278	12.1	1,391	16.4	1,727	18	2,057	18.4	1,791	15.6	1,955	15.5
Other	6,276	82.6	9,291	87.9	7,089	83.6	7,858	82	9,134	81.6	9,697	84.4	10,624	84.5
3.501 – 7.5 tonnes total	7,598	100	10,569	100	8,480	100	9,585	100	11,191	100	11,488	100	12,579	100.0
7.501 – 15 tonnes														
Isuzu[b]	1,670	42.9	1,809	41.4	1,881	38.9	2,311	38.9	2,785	39.8	2,581	36.3	3,121	37.3
Hino[b]	1,187	30.5	1,336	30.6	1,725	35.7	2,140	36	2,300	32.9	2,420	34	2,725	32.6
Mitsubishi[b]	447	11.5	422	9.7	474	9.8	585	9.8	963	13.8	1,094	15.4	1455	17.4
Other	588	15.1	798	18.3	757	15.7	911	15.3	944	13.5	1,021	14.3	1,056	12.6
7.501 – 15 tonnes total	3,892	100	4,365	100	4,837	100	5,947	100	6,992	100	7,116	100	8,357	100.0
Over 15 tonnes														
International[a]	12	0.2	35	0.4	13	0.1	79	0.7	210	1.7	203	1.7	263	1.7
Kenworth[a]	678	10.1	1,319	16.4	1,658	16.2	2,289	18.9	2,283	18.6	2,053	16.7	2,757	17.9
Mack[a]	715	10.6	697	8.6	909	8.9	1,076	8.9	1,123	9.1	1,082	8.8	1,339	8.7
Volvo[a]	942	14	858	10.6	1144	11.2	1,164	9.6	1,137	9.3	1,138	9.3	1,383	9.0
Mitsubishi[b]	145	2.2	148	1.8	473	4.6	567	4.7	684	5.6	788	6.4	1059	6.9
Mercedes[b]	175	2.6	279	3.5	426	4.2	422	3.5	408	3.3	345	2.8	367	2.4
Other	4,054	60.3	4,727	58.6	5,604	54.8	6,535	53.9	6,429	52.4	6,683	54.4	8,202	53.4
Total over 15 tonnes	6,723	100	8,063	100	10,227	100	12,132	100	12,274	100	12,292	100	15,370	100.0

***Table J.7. SUV and truck sales volumes and segment shares in Australia, by model, 2001 to 2007* (continued)**

	2001		2002		2003		2004		2005		2006		2007	
Model line	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**	**Units**	**Share (%)**
Buses														
Volvo[a]	1	0.1	0	0	0	0	0	0	0	0	0	0	0	0.0
Other[a]	745	99.9	615	100	589	100	817	100	838	100	738	100	925	100.0
Total buses	746	100	615	100	589	100	817	100	838	100	738	100	925	100.0
Total heavy trucks	18,959		23,612		24,133		28,281		31,295		31,634		37,231	
TOTAL	243,229		284,069		321,300		365,044		379,465		364,272		412,963	

Note:
a. Assembled/manufactured locally
b. Not assembled/manufactured locally

Source: VFACTS, vehicle retail sales

MOTOR VEHICLE PRODUCTION IN AUSTRALIA

Table J.8. Production of locally-made passenger motor vehicles, derivatives and SUVs, 1997 to 2007

Model	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Ford Falcon family total	88,010	83,436	86,072	85,829	73,388	83,607	104,990	92,747	79,595	60,847	49,701
Domestic market	84,152	78,345	80,410	80,890	68,768	77,382	97,069	86,389	73,972	56,470	46,159
Export market	3,858	5,091	5,662	4,939	4,620	6,225	7,921	6,358	5,623	4,377	3,542
Ford Territory total								18,266	28,431	20,623	18,877
Domestic market								16,274	23,710	17,988	16,607
Export market								1,992	4,721	2,635	2,270
Holden Commodore family total	92,174	116,556	117,476	125,600	129,665	143,161	153,321	165,252	151,901	125,855	107,795
Domestic market	89,480	107,260	97,401	98,821	101,074	111,416	117,262	112,971	91,710	79,828	71299
Export market	2,694	9,296	20,075	26,779	28,591	31,745	36,059	52,281	60,191	46,027	36,496
Holden Vectra total		2,817	10,122	7,551							
Domestic market		2,375	7,276	5,132							
Export market		442	2,846	2,419							
Mitsubishi Magna family total[a]	59,275	46,506	34,766	38,451	43,502	46,437	34,763	21,418	18,672	10,493	10,321
Domestic market	41,579	36,957	24,798	26,415	24,287	22,387	24,777	15,893	16,174	10,438	10,074
Export market	17,696	9,549	9,968	12,036	19,215	24,050	9,986	5,525	2,498	55	247
Toyota Camry family total[b]	57,586	80,609	85,046	87,916	91,781	78,790	106,897	104,864	105,481	103,619	111,891
Domestic market	30,077	46,598	40,392	33,605	26,608	28,971	40,685	39,546	36,492	26,172	26,902
Export market	27,509	34,011	44,654	54,311	65,173	49,819	66,212	65,318	68,989	77,447	84,989
Toyota Avalon total				14,339	8,838	7,756	6,697	4,990	3,741		
Domestic market				13,805	8,776	7,507	6,697	4,990	3,741		
Export market				534	62	249	0	0	0		
Toyota Aurion total										7,991	37,040
Domestic market										5,790	24,351
Export market										2,201	12,689
TOTAL PRODUCTION	**319,266**	**353,892**	**347,823**	**359,686**	**347,174**	**359,751**	**406,668**	**407,537**	**387,821**	**329,428**	**335,625**
Domestic market	**267,509**	**295,503**	**264,618**	**258,668**	**229,513**	**247,663**	**286,490**	**276,063**	**245,799**	**196,686**	**195,382**
Export market	**51,757**	**58,389**	**83,205**	**101,018**	**117,661**	**112,088**	**120,178**	**131,474**	**142,022**	**132,742**	**140,243**

Note:
a. Includes Magna, Verada, Diamante and 380 models.
b. Production and export figures for Toyota Camry include 'completely knocked down' units (unassembled vehicles).

Source: Department of Innovation, Industry, Science and Research industry survey

Table J.9. Value of production of locally-made passenger motor vehicles and derivatives, 1997 to 2007

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Production value ($b)	7.23	8.18	8.18	7.74	7.97	7.99	8.48	8.89	8.41	7.84	7.74

Source: Department of Innovation, Industry, Science and Research industry survey

Table J.10. Quality performance of locally-made PMVs, 2000 to 2006

Category	Model	Sample average faults per vehicle						
		2000	2001	2002	2003	2004	2005	2006
Medium	Toyota Camry (4)	0.7	0.9	0.8	0.8	0.6	0.7	0.5
	Medium category average	0.8	0.8	0.7	0.6	0.6	0.6	0.5
Large	Ford Falcon	1.5	1.2	1.3	1.4	1.3	1.3	1
	Holden Commodore	1.1	1.1	1.2	1.2	1.3	1.2	1.2
	Toyota Aurion	n/a	n/a	n/a	n/a	n/a	n/a	0.7
	Toyota Camry (V6)	1.1	0.7	0.9	0.8	0.7	0.8	0.6
	Mitsubishi 380	n/a	n/a	n/a	n/a	n/a	n/a	0.6
	Toyota Avalon	1	1.4	0.7	0.9	1.1	1.1	n.a
	Mitsubishi Magna	0.9	1	0.9	0.9	1	0.7	n.a
	Large category average	1.1	1.1	1	1	1	1	0.8

Note: Faults data derive from responses to surveys of private new car buyers in the first three months of ownership.

Source: AC Nielsen, 2006 New Car Buyer Survey

Table J.11. Sales of components by Federation of Automotive Product Manufacturers member companies, 1997 to 2007

Year	Domestic sales ($b)	Export sales ($b)	Total sales ($b)	Annual growth (%)
1997	4.98	0.72	5.70	2.7
1998	5.10	0.75	5.85	2.6
1999	5.69	1.05	6.74	15.2
2000	5.28	1.17	6.45	-4.3
2001	5.31	1.18	6.49	0.6
2002	6.09	1.37	7.46	14.9
2003	7.02	1.31	8.33	11.7
2004	6.46	1.17	7.63	-8.4
2005	6.31	1.02	7.32	-4.0
2006	5.15	1.19	6.34	-13.4
2007	6.17	1.51	7.67	21.0

Note: Sales figures are in current prices

Source: Federation of Automotive Product Manufacturers

PRICES

Table J.12. Quarterly index of motor vehicle prices, Consumer Price Index (CPI) and average weekly earnings, 1998 to 2007

Year	Quarter	CPI (all groups)[a]	CPI (motor vehicles)[a]	Average weekly earnings[b]	AAIR affordability index[c,d]	Year	Quarter	CPI (all groups)[a]	CPI (motor vehicles)[a]	Average weekly earnings[b]	AAIR affordability index[c,d]
1998	**March**	120.3	111.4	137.0	123.0	**2003**	**March**	141.3	106.1	169.0	159.3
	June	121.0	109.1	138.0	126.5		**June**	141.3	105.1	172.9	164.5
	September	121.3	106.9	139.5	130.5		**September**	142.1	104.6	174.9	167.2
	December	121.9	106.0	141.1	133.1		**December**	142.8	103.8	177.5	171.0
1999	**March**	121.8	105.5	140.9	133.5	**2004**	**March**	144.1	101.9	178.7	175.3
	June	122.3	105.1	142.1	135.2		**June**	144.8	102.0	178.6	175.1
	September	123.4	105.8	141.9	134.1		**September**	145.4	100.2	181.5	181.1
	December	124.1	104.1	144.7	139.0		**December**	146.5	101.7	184.7	181.6
2000	**March**	125.2	104.6	145.8	139.4	**2005**	**March**	147.5	100.3	187.9	187.2
	June	126.2	104.6	147.7	141.2		**June**	148.4	99.2	190.3	192
	September	130.9	102.0	150.4	147.5		**September**	149.8	99	192.3	194.4
	December	131.3	101.6	150.8	148.4		**December**	150.6	97.9	193.9	197.9
2001	**March**	132.7	103.5	151.8	146.7	**2006**	**March**	151.9	99.3	195.1	196.3
	June	133.8	105.6	154.8	146.6		**June**	154.3	98.3	195.6	199.5
	September	134.2	106.0	156.9	148.0		**September**	155.7	99.1	197.6	199.2
	December	135.4	106.6	159.2	149.3		**December**	155.5	99.4	199.0	200.4
2002	**March**	136.6	107.6	161.3	149.9	**2007**	**March**	155.6	99.5	201.2	202.2
	June	137.6	106.6	162.8	152.7		**June**	157.5	99.7	204.2	204.8
	September	138.5	105.6	165.0	156.3		**September**	158.6	99.6	207.2	208.0
	December	139.5	106.6	167.5	157.1		**December**	160.1	98.9	208.5	210.8

Note:
a. From ABS cat. no. 6401.0.
b. Average weekly earnings (full-time adult total earnings) rebased from ABS cat. no. 6302.0.
c. All indexes have 1989-90 as base year. The Affordability Index is based on methodology used by the former Automotive Industry Authority and the Australian Automotive Intelligence Report (AAIR).
d. The Affordability Index is based on methodology used by the Automotive Industry Authority and the Australasian Association for Institutional Research.

Source: ABS cat. no's 6401.0 and 6302.0

Table J.13. Australian dollar value against selected international currencies, 1998 to 2007

Year	Quarter	Yen	US Dollar	Euro	Won	Year	Quarter	Yen	US Dollar	Euro	Won
1998	**March**	86	0.67	n/a	1025	**2003**	**March**	71	0.60	0.55	722
	June	86	0.63	n/a	865		**June**	77	0.65	0.56	780
	September	83	0.59	n/a	783		**September**	76	0.66	0.58	769
	December	74	0.62	n/a	781		**December**	79	0.73	0.60	866
1999	**March**	75	0.63	0.57	758	**2004**	**March**	82	0.76	0.62	893
	June	79	0.66	0.63	772		**June**	78	0.71	0.59	824
	September	72	0.65	0.61	779		**September**	78	0.70	0.58	817
	December	67	0.65	0.63	751		**December**	80	0.77	0.58	819
2000	**March**	67	0.62	0.64	695	**2005**	**March**	82	0.78	0.60	792
	June	62	0.59	0.63	657		**June**	83	0.77	0.61	776
	September	61	0.57	0.63	631		**September**	85	0.76	0.62	783
	December	59	0.53	0.61	640		**December**	87	0.74	0.62	761
2001	**March**	62	0.52	0.57	666	**2006**	**March**	86	0.74	0.61	712
	June	62	0.51	0.59	663		**June**	86	0.75	0.59	713
	September	62	0.51	0.57	662		**September**	88	0.76	0.59	724
	December	64	0.51	0.57	662		**December**	92	0.78	0.60	731
2002	**March**	69	0.52	0.60	684	**2007**	**March**	94	0.79	0.60	742
	June	69	0.56	0.59	690		**June**	101	0.83	0.62	773
	September	66	0.55	0.56	661		**September**	100	0.85	0.62	789
	December	68	0.56	0.56	676		**December**	101	0.90	0.61	825

Source: Reserve Bank of Australia Statistical Table F11

TRADE

Table J.14. Value and growth of automotive exports, 1998 to 2007

Year	Vehicle exports		Components exports		Total exports	
	Value ($b)	Annual growth (%)	Value ($b)	Annual growth (%)	Value ($b)	Annual growth (%)
1998	1.30	2.7	1.28	- 10.8	2.57	- 5.4
1999	1.76	35.7	1.49	17.1	3.25	26.3
2000	2.42	37.9	1.80	19.9	4.22	29.9
2001	3.26	34.6	1.68	- 6.6	4.94	17.0
2002	3.08	- 5.6	1.77	3.9	4.85	- 1.8
2003	2.98	- 3.4	1.77	- 0.3	4.74	- 2.3
2004	3.03	1.7	1.68	- 4.9	4.71	- 0.7
2005	3.47	14.7	1.71	2	5.19	10.2
2006	3.06	- 11.8	1.82	6.2	4.88	- 5.8
2007	3.24	5.7	1.87	2.6	5.11	4.6

Note: Export figures are in nominal prices

Source: Department of Foreign Affairs and Trade, STARS Database

Table J.15. Automotive exports by destination, 2002 to 2007

Region	2002		2003		2004		2005		2006		2007	
	Exports ($ m)	Share (%)	Exports ($ m)	Share (%)	Exports ($ m)	Share (%)	Exports ($ m)	Share (%)	Exports ($ m)	Share (%)	Exports ($ m)	Share (%)
Middle East	1,801	37.1	1,893	39.9	1,745	37.1	1,944	37.5	2,205	45.2	2,299	45.0
New Zealand	720	14.8	825	17.4	758	16.1	789	15.2	653	13.4	754	14.8
NAFTA	1,111	22.9	791	16.7	1,026	21.8	805	15.5	657	13.4	568	11.1
Republic of Korea	365	7.5	449	9.5	324	6.9	386	7.4	389	8	399	7.8
EU25	170	3.5	145	3.1	209	4.4	242	4.7	309	6.3	233	4.6
ASEAN	255	5.3	185	3.9	188	4	247	4.8	202	4.1	216	4.2
China	16	0.3	58	1.2	65	1.4	285	5.5	91	1.9	200	3.9
South Africa	30	0.6	68	1.4	78	1.7	188	3.6	84	1.7	103	2.0
Japan	164	3.4	105	2.2	85	1.8	64	1.2	61	1.2	67	1.3
Rest of world	221	4.5	224	4.7	230	4.9	237	4.6	233	4.8	268	5.2
Total	**4,853**	**100**	**4,743**	**100**	**4,708**	**100**	**5,187**	**100**	**4,884**	**100**	**5,106**	**100**

Note: Figures in nominal prices

Source: Australian Bureau of Statistics

Table J.16. Exports of new completely built-up passenger motor vehicles, derivatives and SUVs, 1999 to 2007

Year	Units	Annual growth (%)
1999	83,205	42.5
2000	101,018	21.4
2001	117,661	16.5
2002	112,088	- 4.7
2003	120,178	7.2
2004	131,474	9.4
2005	142,022	8.0
2006	132,742	- 6.5
2007	140,243	5.7

Source: Department of Innovation, Industry, Science and Research industry survey

Table J.17. Exports of components, 1997 to 2007

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Component	**($ m)**	**($ m)**	**($ m)**	**($ m)**	**($ m)**	**($ m)**	**($ m)**	**($ m)**	**($ m)**	**($ m)**	**($ m)**
Engines	405	291	356	472	270	180	255	300	434	575	515
Engine parts	199	146	153	172	146	159	146	153	150	132	128
Other components	844	841	985	1,156	1,262	1,431	1,364	1,227	1,129	1,113	1,225
Total	**1,448**	**1,278**	**1,494**	**1,800**	**1,678**	**1,770**	**1,765**	**1,680**	**1,713**	**1,820**	**1,868**

Note: Export figures are in nominal prices.

Source: Department of Foreign Affairs and Trade, STARS Database

Table J.18. Value and growth of automotive imports into Australia, 1998 to 2007

Year	Vehicle imports		Components imports		Total imports	
	Value ($b)	Annual growth (%)	Value ($b)	Annual growth (%)	Value ($b)	Annual growth (%)
1998	9.38	23.3	5.15	16.3	14.54	20.7
1999	9.92	5.7	5.09	- 1.2	15.01	3.2
2000	11.17	12.6	5.78	13.4	16.94	12.9
2001	11.61	4.0	6.02	4.2	17.62	4.0
2002	13.20	13.7	5.71	- 5.1	18.91	7.3
2003	14.52	10.0	5.77	1.0	20.29	7.3
2004	15.72	8.2	5.81	0.7	21.52	6.1
2005	17.46	11.1	5.99	3.1	23.45	8.9
2006	18.36	5.2	6.16	2.9	24.52	4.6
2007	20.91	13.9	7.04	14.3	27.95	14.0

Note: Figures are in nominal prices

Source: Department of Foreign Affairs and Trade, STARS Database

Table J.19. Automotive imports into Australia: By source country, 2002 to 2007

Source	2002		2003		2004		2005		2006		2007	
	Imports ($m)	Share (%)	Imports ($m)	Share (%)	Imports ($m)	Share (%)	Imports ($m)	Share (%)	Imports ($m)	Share (%)	Imports ($m)	Share (%)
Japan	8,820	46.6	9,330	46	9,675	45	9,572	40.8	9,129	37.2	9,448	33.8
EU25	4,176	22.1	4,702	23.2	4,686	21.8	5,208	22.2	5,135	20.9	6,128	21.9
NAFTA	2,972	15.7	2,788	13.7	3,153	14.6	3,090	13.2	3,618	14.8	3,966	14.2
ASEAN	951	5	1,241	6.1	1,337	6.2	2,159	9.2	2,681	10.9	4,483	16.0
Republic of Korea	767	4.1	784	3.9	949	4.4	1,222	5.2	1,546	6.3	1,687	6.0
South Africa	435	2.3	579	2.9	581	2.7	887	3.8	995	4.1	768	2.7
China	165	0.9	217	1.1	303	1.4	387	1.6	523	2.1	660	2.4
Taiwan	168	0.9	163	0.8	181	0.8	199	0.8	319	1.3	284	1.0
South America	180	0.9	159	0.8	170	0.8	199	0.8	136	0.6	95	0.3
Rest of World	278	1.5	325	1.6	489	2.3	523	2.2	443	1.8	445	1.6
Total	**18,910**	**100**	**20,288**	**100**	**21,523**	**100**	**23,445**	**100**	**24,524**	**100**	**27,944**	**100**

Note: Figures are in nominal prices.

Source: Department of Foreign Affairs and Trade, STARS Database

Table J.20. Imports of completely built-up vehicles, passenger motor vehicles and other motor vehicles, 2000 to 2007

Year	CBU PMVs (units)	Other vehicles (units)	Total vehicles (units)	Annual growth (%)
2000	319,471	234,083	553,554	6.5
2001	330,464	210,657	541,121	- 2.2
2002	316,431	264,966	581,397	7.4
2003	354,520	296,209	650,729	11.9
2004	366,547	327,842	694,389	6.7
2005	436,750	360,770	797,520	14.9
2006	476,251	368,521	844,772	5.9
2007	506,136	426,089	932,225	10.4

Source: Department of Foreign Affairs and Trade, STARS Database

EMPLOYMENT AND LABOUR PRODUCTIVITY

Table J.21. Australian automotive industry employment, 1997–98 to 2005–06

Industry sector	1997–98	1998–99	1999–00	2000–01	2001–02	2002–03	2003–04	2004–05	2005–06
Motor vehicle manufacturing[a]	19,719	18,168	16,519	23,243	25,600	26,600	28,100	27,800	27,100
Motor vehicle body manufacturing[b]	8,443	7,888	10,260	9,908	10,900	10,300	11,600	12,400	15,300
Automotive electrical and instrument manufacturing[c]	4,734	5,001	5,287	5,085	4,200	3,000	3,200	3,500	3,000
Automotive component manufacturing[d]	22,262	20,414	22,422	24,424	21,800	25,200	26,800	24,200	21,800
Total	55,158	51,471	54,488	62,660	62,500	65,100	69,800	67,900	67,100

Note:
a. ANZSIC Code 2811.
b. ANZSIC Code 2812.
c. ANZSIC Code 2813.
d. ANZSIC Code 2819.

Source: Australian Bureau of Statistics cat. no. 8221.0

Table J.22. Local vehicle producer labour productivity, 1997 to 2007

Year	Production volume (units)[a]	Production value ($b)[b]	Employment[c]	Average vehicles produced per employee	Average production value per employee
1997	319,266	7.23	20,540	15.5	$351,996
1998	353,892	8.18	22,371	15.8	$365,652
1999	347,823	8.18	21,394	16.3	$382,350
2000	359,686	7.74	20,378	17.7	$379,821
2001	347,174	7.97	19,975	17.4	$398,999
2002	359,751	7.99	20,914	17.2	$382,041
2003	406,668	8.48	23,119	17.6	$366,798
2004	407,537	8.89	22,485	18.1	$395,375
2005	387,821	8.41	20,908	18.5	$402,238
2006	329,428	7.84	18,390	17.9	$426,319
2007	335,625	7.74	17,751	18.9	$435,947

Note:
a. Includes completely knocked down (unassembled) vehicles for export.
b. In nominal prices.
c. Includes production and non-production employees.

Source: Department of Innovation, Industry, Science and Research industry survey

PROFITABILITY AND R&D EXPENDITURE

Table J.23. Profit performance of local vehicle producers, 1997 to 2007

Year	Vehicle manufacturing		Total PMV activities[a]	
	Net trading profit (loss) ($m)	Return on sales (%)	Net trading profit (loss) ($m)	Return on sales (%)
1997	344	4.9	518	5.4
1998	389	5.0	502	4.6
1999	311	3.9	391	3.8
2000	427	5.1	384	3.3
2001	298	3.4	184	1.3
2002	383	4.6	411	2.5
2003	316	2.7	449	2.6
2004	(115)	- 1.0	247	1.3
2005	(590)	- 6.5	(569)	- 3.4
2006	(705)	- 8.0	(502)	- 2.8
2007	(722)	- 8.6	(449)	- 2.5

Note: Figures represent profit before tax (current prices) for Holden, Ford Australia, Toyota Motor Corporation Australia and Mitsubishi Motors Australia.
a. Includes passenger motor vehicle manufacturing, sales of imported PMVs and shared vehicles, sales of imported components as parts and accessories, and component production for local sale and export.

Source: Department of Innovation, Industry, Science and Research industry survey

Table J.24. Australian automotive industry R&D expenditure, 1997–98 to 2005–06

Financial year	R&D expenditure ($'000)	Annual growth (%)
1997–98	359,456	14.8
1998–99	316,626	- 11.9
1999–00	347,945	9.9
2000–01	381,349	9.6
2001–02	490,164	28.5
2002–03	618,719	26.2
2003–04	638,570	3.2
2004–05	607,903	- 4.8
2005–06	654,204	7.6

Note: Expenditure is in current prices and is for ANZSIC Industry Group 281, Motor vehicle and part manufacturing

Source: Australian Bureau of Statistics cat. no. 8104.0, unpublished data.

APPENDIX K: REVIEW PROCESSES

ANNOUNCEMENT OF THE AUTOMOTIVE REVIEW 2008

On 14 February 2008, the Minister for Innovation, Industry, Science and Research announced the Review of Australia's Automotive Industry ('the Review'), to be conducted by the Hon Steve Bracks. The announcement included the Review's terms of reference and noted that Mr Bracks would be supported by an expert panel. The announcement also stated that:

- the Review would provide an interim report to the Australian Government by 31 March 2008, and a final report by 31 July 2008;
- the Productivity Commission would be requested to undertake modelling of the economy-wide effects of future automotive assistance options; and
- the Review would have regard to the issues raised in the concurrent Review of the National Innovation System.[1]

The Australian Government Department of Innovation, Industry, Science and Research provided secretariat support to the Review.

Appendix N provides a list of Review participants and their respective roles.

STAKEHOLDER CONSULTATIONS

The Review established a website at www.innovation.gov.au/automotivereview and an email address automotivereview@innovation.gov.au to assist with dissemination of information to, and engagement with, the public.

In addition, letters were sent to identified stakeholders informing them about the Review as well as anticipated time frames and processes.

The Review held meetings and interviews with a range of stakeholders – see Appendix M for a list of stakeholder organisations consulted.

INTERIM REPORT AND PUBLIC SUBMISSIONS

On 31 March 2008, the Review delivered its interim report to the Australian Government. Also on that day, the Review publicly released a background paper and discussion paper, and invited public submissions.[2]

The closing date for public submissions was 14 May 2008, but some submissions were lodged after that date. In total, 133 submissions were lodged with the Review prior to this report's printing deadline – see Appendix L for the list. Each submission received was posted to the Review's website unless the originator requested that its submission be treated as confidential.

1 Carr, K (Minister for Innovation, Science and Research), *Government announces review of automotive industry*, media release, 14 February 2008, viewed at http://minister.innovation.gov.au/SenatortheHonKimCarr/Pages/GOVERNMENTANNOUNCESREVIEWOFAUTOMOTIVEINDUSTRY.aspx.

2 Refer to www.innovation.gov.au/automotivereview.

PRODUCTIVITY COMMISSION'S ECONOMIC MODELLING

On 4 April 2008, the Assistant Treasurer asked the Productivity Commission to undertake economic modelling of future automotive assistance options.[3] The scenarios for the various policy options were requested by the Review. On 5 June 2008, the Productivity Commission publicly released its report, *Modelling the Economy-wide Effects of Future Automotive Assistance – Productivity Commission Research Report*.[4]

INFORMATION SOURCES

In preparing this final report, the Review drew on a variety of sources for information including public submissions; stakeholder consultations; publicly available as well as unpublished information; the Productivity Commission's report; and research specifically commissioned by the Review on spillovers from the automotive industry.

3 Available at http://www.pc.gov.au/study/automodelling/additionalinformation/letter.pdf.

4 Available at http://www.pc.gov.au/study/automodelling/study/finalreport.

APPENDIX L:
PUBLIC SUBMISSIONS TO THE REVIEW OF AUSTRALIA'S AUTOMOTIVE INDUSTRY

Submission no.	Originator
1	Arno Van Winden
2	Engineering and Design AG group
3	John R Siddons
4	Loris Erik Kent Hemlof
5	Industry Capability Network Ltd
6	Lance Dover
7	Bill Asikas
8	Carol O'Donnell
9	Leonie Francis (TST Carpet Manufacturers)
10	Charlie Maddaluno
11	Guy Caruana
12	RMAX
13	Michael Pope
14	Peter Gill
15	Wesley Kozlowski
16	Kevin Baker
17	Keith Rhodes
18	Geoff Perry
19	Centre for Education and Research in Environmental Strategies
20	Electorate of Hindmarsh
21	International Car Distribution Programme Australia Pty Ltd
22	Mike Stelzig
23	Australian Automotive Research Centre
24	George Deragopian
25	Milan Terzic
26	Alan Parker
27	Denso
28	Frank Will
29	Joseph Scalzo
30	Phil Browne
31	FR-1

Submission no.	Originator
32	Continental Pty Ltd
33	Campbell James
34	Jonathan Sutton
35	Victorian Government
36	Kevin Fennell
37	Des O'Callaghan
38	Innovation Australia
39	Automotive Alternative Fuels Registration Board
40	William Jolly
41	Truck Industry Council
42	Viridian
43	Lauchlan McIntosh
44	Australian Academy of the Humanities
45	Save Geelong Manufacturing Committee
46	Henkel Adhesives
47	Software Project Engineering Pty Ltd
48	IMPCO Technologies Pty Ltd
49	PKM Multi-Fuel Pty Ltd
50	Peter Evans
51	Andrew Close
52	European Commission
53	Super Cheap Auto
54	National ICT Australia
55	Peter Phillips
56	Automotive Training Australia Limited
57	Australian Productivity Council
58	Engineering and Design AG group
59	Lighter Footprints
60	AutoCRC
61	Australian Manufacturing Workers' Union, Federation of Vehicle Industry Unions, Australian Workers' Union and National Union of Workers – joint submission

Submission no.	Originator
62	Suzuki Australia Pty Ltd
63	NLC Pty Ltd
64	Australian Conservation Foundation
65	Australian Automotive Aftermarket Association
66	LPG Australia
67	SGFleet Australia Pty Ltd
68	Hella Australia Pty Ltd
69	Advanced Manufacturing Australia
70	Robert Bosch (Australia) Pty Ltd
71	McLean Management Consultants
72	University of South Australia
73	Futuris Automotive Group
74	Ford Motor Company of Australia Ltd
75	Palm Plastics
76	National Civic Council
77	Aeronautical and ExtraEnergy E.V
78	Business SA
79	Air International Thermal (Australia) Pty Ltd
80	Toyota Motor Corporation Australia
81	Dr Michael Brear
82	Phil Barton
83	Australian Performance Vehicles Pty Ltd
84	Renewable Fuels Australia
85	EMC Technologies Pty Ltd
86	Bluescope Steel Limited
87	Toyota Boshoku Australia
88	Drivetrain Systems International Pty Ltd
89	Kangan Batman TAFE
90	MTM Pty Ltd
91	Federation of Automotive Products Manufacturers
92	Edward O'Brien
93	Australian New Car Assessment Program
94	Peter Veal
95	Australian Fleet Managers Association
96	CSIRO
97	Orbital Australia Pty Ltd
98	Victorian Automobile Chamber of Commerce
99	Federal Chamber of Automotive Industries
100	Peter Pudney
101	Aisin (Australia) Pty Ltd
102	South Australian Government
103	Ken Mansell
104	Australian Automobile Association
105	Motor Trades Association of Queensland
106	William Buck Business Advisors
107	GM Holden Ltd
108	Royal Automobile Club of Queensland
109	Ocean Engineering Systems CNG

Submission no.	Originator
110	Pivotal Engineering Ltd
111	Stephen Darday
112	Youth Equity Inc
113	Department of Foreign Affairs and Trade
114	NRMA
115	Royal Melbourne Institute of Technology
116	Derek Healey
117	Department of Education, Employment and Workplace Relations
118	Australian Automobile Dealers Association
119	Insurance Australia Group
120	Queensland Government
121	Turan Ahmed
122	City of Geelong
123	Australian Institute of Petroleum
124	Victorian Employers' Chamber of Commerce and Industry
125	Australian Industry Group
126	McMillan Shakespeare
127	Geelong Manufacturing Council
128	David Taweel
129	Christopher Gellie
130	Bob Charters
131	David Frick
132	John Lyons
133	Christopher Dobbyns

APPENDIX M: STAKEHOLDER MEETINGS AND CONSULTATIONS

ASSOCIATIONS

Advanced Manufacturing Australia

Australian Automobile Association

Australian Automotive Aftermarket Association

Australian Conservation Foundation

Australian Industry Group

Australian Manufacturing Workers' Union

Australian Workers' Union

Federal Chamber of Automotive Industries

Federation of Automotive Products Manufacturers

Federation of Vehicle Industry Unions

Industry Capability Network Limited

LPG Australia

Motor Trades Association of Australia

National Union of Workers

Truck Industry Council

AUTOMOTIVE COMPONENT SUPPLIERS

Aisin (Australia)

ARB

Australian Automotive Air

Bishop Technology Group

Denso International Australia

Disc Brakes Australia

Futuris Automotive Group

Orbital Corporation

OzPress

CONCURRENT REVIEWS

Garnaut Climate Change Review

Review of Australia's Export Policies and Programs

Review of Australia's Textile, Clothing and Footwear Industry

Review of the National Innovation System

CONSULTANTS

Australian Automotive Intelligence

Autopolis

Deloitte

Firmstone and Feil

Grant Thornton

Lateral Economics

Public Relations Exchange

GOVERNMENT ORGANISATIONS

Austrade

Australian Government

Commonwealth Scientific and Industrial Research Organisation

Department of Climate Change

Department of Environment, Water, Heritage and the Arts

Department of Foreign Affairs and Trade

Department of Infrastructure, Transport, Regional Development and Local Government

Department of Innovation, Industry, Science and Research

Department of Trade and Economic Development

Productivity Commission

Treasury

Victorian Government

South Australian Government

MOTOR VEHICLE IMPORTERS

Mazda Australia

Honda Australia

Mercedes-Benz Australia/Pacific

MOTOR VEHICLE PRODUCERS – AUSTRALIAN

GM Holden

Ford Motor Company of Australia

Mitsubishi Motors Australia (up to March 2008)

Toyota Motor Corporation Australia

MOTOR VEHICLE PRODUCERS – FOREIGN

General Motors

Ford Motor Company

Toyota Motor Corporation

OTHER ORGANISATIONS

Automotive Supplier Excellence Australia

Automotive Training Australia

Biomax

Cooperative Research Centre for Advanced Automotive Technology (AutoCRC)

Project Better Place

V8 Supercars Australia

APPENDIX N:
REVIEW PARTICIPANTS

Review leader:	Hon Steve Bracks
Expert panel:	Mr Nixon Apple
	Mr Tim Harcourt
	Mr Peter Upton
	Dr Elizabeth Webster
Secretariat:	Mr Geoff Lewis (Manager)
	Dr France Desaubin
	Mr Vern Lim
	Mr Mark Mussared
	Mr Doug Williamson

ABBREVIATIONS AND DEFINITIONS

AAA	Australian Automobile Association
AAAA	Australian Automotive Aftermarket Association
ABS	Australian Bureau of Statistics
ACIS	Automotive Competitiveness and Investment Scheme
ACP	automotive component producer (ACIS registration category)
ADRs	Australian Design Rules
AMTP	automotive machine tooling producer (ACIS registration category)
ANCAP	Australasian New Car Assessment Program
AP	Approved Permit
APEC	Asia-Pacific Economic Cooperation
ASEA	Automotive Supplier Excellence Australia
ASEAN	Association of Southeast Asian Nations
ATA	Automotive Training Australia
AutoCRC	Cooperative Research Centre for Advanced Automotive Technology
BERD	business expenditure on research and development
CNG	compressed natural gas
CO_2	carbon dioxide
crossover utility vehicle	SUV with some characteristics of a passenger car
DDA	Doha Development Agenda
DFAT	Department of Foreign Affairs and Trade
DIISR	Department of Innovation, Industry, Science and Research
EU	European Union
FAPM	Federation of Automotive Products Manufacturers
FBT	fringe benefits tax
FCAI	Federal Chamber of Automotive Industries
FTA	free trade agreement
GCC	Gulf Cooperation Council
GCIF	Green Car Innovation Fund
GDP	gross domestic product

GHG	greenhouse gas
GM	General Motors
GST	goods and services tax
GVG	Green Vehicle Guide
HR	human resources
ICNL	Industry Capability Network Limited
IP	intellectual property
large vehicle	passenger car, hatch, sedan or wagon, six to 12 cylinders
LCT	luxury car tax
light vehicle	passenger car, hatch, sedan or wagon, three or four cylinders, with an engine capacity up to 1,500 cubic centimetres
LPG	liquefied petroleum gas
LS	low sulphur
medium vehicle	passenger car, hatch, sedan or wagon, four to twelve cylinders, with an engine capacity of 1,901 cubic centimetres and upward
MVP	Motor Vehicle Producer (also an ACIS registration category)
n.e.c.	not elsewhere classified
NRMA	National Roads and Motorists Association
PMV	passenger motor vehicle
ppm	parts per million
PULP	premium unleaded petrol
R&D	research and development
small vehicle	Passenger car, hatch, sedan or wagon, four to six cylinders, with an engine capacity of 1,501 cubic centimetres plus
spillovers	economic benefits from a sector that have positive effects on other sectors or industries
sports vehicles	coupe or convertible, three to 12 cylinders
SUV	sports utility vehicle; two- or four-wheel drive, high ground clearance, closed cargo space
TAFTA	Thailand–Australia Free Trade Agreement
TCO	tariff concession order
Tier	A layered structure in the automotive supply chain such that a Tier 1 supplier provides goods and/or services to an MVP, a Tier 2 supplier provides goods and/or services to a Tier 1 supplier, Tier 3 to Tier 2, and so on
TQM	total quality management
upper large vehicle	passenger car, hatch, sedan or wagon, six to 12 cylinders
ULP	unleaded petrol
ULS	ultra-low sulphur
UNECE	United Nations Economic Commission for Europe
WTO	World Trade Organization

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