
4 The modelling

Given the relatively small share of the Australian economy accounted for by the automotive industry and the relatively small reductions in tariff rates, one would expect the modelled changes to have relatively small economy-wide effects. The distributional and intersectoral effects could be expected to be more significant, as could effects on the automotive industry itself.

The interactions between the tariff and Automotive Competitiveness and Investment Scheme (ACIS) are complex. As a result, the strategy in this chapter is first to provide a framework which describes the main mechanisms at work in the model (section 4.1). Four ‘reference simulations’ were designed to illustrate the interactions between the tariff and ACIS (section 4.2). Results for options and sensitivity simulations are discussed in sections 4.3 and 4.4 respectively.

4.1 Main mechanisms at work

Lowering automotive tariffs will generally *reduce* the selling prices of imported cars and components. This can benefit private buyers of cars and business users of cars and automotive inputs. It can particularly benefit those industries that are exposed to international trade. Automotive producers can benefit from tariff reductions through lower prices on their imported automotive inputs.

Lower import prices also encourage a switch in demand away from domestic production towards imports, putting pressure on the profits and outputs of local assemblers and component manufacturers. This, in turn, puts pressure on these sectors to reduce their costs, which they can do in part by switching their input mix towards the now less costly imported inputs, and by pursuing productivity and technological improvements.

Reducing budgetary assistance will generally *reduce* the price of domestically-produced automotive products. Hence, like a reduction in tariffs, a reduction in budgetary assistance imposes pressures on assemblers and component makers to find cost savings. However, unlike a tariff reduction, it does not bring about the extra benefits of reducing prices to consumers and business. This is because, compared with a tariff, a producer subsidy does not increase, and may even decrease, consumer prices. Thus, subject to being able to source government

revenues in a way that minimises deadweight losses from raising taxes — an important proviso — reducing budgetary assistance can be expected to be less beneficial than reducing tariffs which assist the industry to a similar degree, all other things being equal (box 4.1).

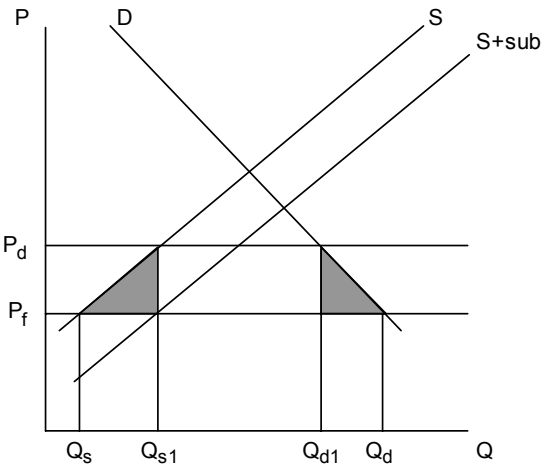
Box 4.1 The differing effect of tariffs and subsidies

Differences exist in how import tariffs and production subsidies influence relative prices, and the behaviour of firms and consumers. These differences need to be taken into account in evaluating policy options.

A tariff increases the domestic price (P_d in diagram below) of a good relative to the foreign price (P_f). This higher domestic price raises domestic production above the efficient level (from Q_s to Q_{s1}), but reduces consumption from Q_d to Q_{d1} . Part of the loss in consumer surplus from higher prices is transferred to producers (producer surplus) and to the Government (tariff revenue). However, a deadweight loss is also incurred, given by the area in the shaded triangles in the diagram below.

If instead, in the presence of trade, the industry were assisted by a production subsidy, represented by a shift in the supply curve from S to $S+sub$, the same expansion of the industry would occur as with the tariff, generating the same shaded triangle of deadweight loss on the left in the diagram. However, unlike the tariff, the consumer price would remain at the world price (P_f) and the triangle on the right would not appear.

To the extent that they avoid the deadweight loss on the consumption side (right-hand triangle in the diagram), production subsidies are less distortionary than import tariffs. In this sense, assuming that the government funds the subsidy through an efficient tax, subsidies are preferable to import tariffs as they are a less costly means of promoting activity in an industry.



The economy-wide effects of policy changes are conditioned by the many settings in the model as discussed in chapter 3. Reducing tariffs affects real consumption (an indicator of welfare) through three main mechanisms in the model.

1. *Allocative efficiency effects.* Tariffs distort the decisions of consumers and downstream industries in favour of domestic over lower-cost imported products. Reducing tariffs improves allocative efficiency across the economy, as resources exit the automotive industry and are reallocated to more efficient industries.
2. *Terms of trade effects.* In the MMRF model, as in many other economic models, it is assumed that Australian firms can only sell greater volumes on world markets by accepting a lower price (the ‘almost-small economy’ assumption described in chapter 3). To the extent that policy changes raise the share of resources allocated to export-intensive industries, Australians face a reduction in the prices of their exports relative to the prices of imports. Therefore, although tariff reductions are likely to generate cost reductions and encourage increased exports in the model, this is at the cost of a decline in Australia’s terms of trade, and therefore in income that can be allocated to consumption.
3. *Resource expansion effects.*¹ Aggregate employment in the model is fixed by assumption. In the central closure, Australia’s capital stock can be financed by domestic and foreign investors, giving the economy the capacity to expand. Although foreigners receive the returns on the capital they financed, Australians can still gain from greater foreign capital because of domestic taxes on repatriated profits. In addition, an increase in the capital stock increases the productivity of labour and, thus, real wages. Therefore, tariff reductions would cause a fall in the cost of purchasing capital goods in Australia, encouraging capital accumulation.

The allocative efficiency and resource expansion effects are referred to collectively in this study as *resource effects*. These effects contribute toward an increase in economic activity.

How the expansion in the resource base operates is analysed by comparing scenarios R1 and R4, as discussed below. In this latter simulation, the expansion effect is constrained to isolate the reallocation effects and their associated terms of trade effects.²

¹ The assumption about how capital is financed determines whether this mechanism operates or not.

² As noted earlier, however, there is evidence that a reduction in assistance can drive efficiency improvements in the assisted industry (PC 2002). For illustrative purposes, the Commission has modelled a productivity improvement in the car industries. These results are discussed at the end of the chapter.

As illustrated in box 4.1, tariff reductions are likely to generate greater economy-wide gains in the model than equivalent reductions in budgetary assistance in terms of resource effects. But, in doing so, they are also likely to generate greater terms of trade losses. The net outcome depends on the strength of these opposing effects.

As discussed in chapter 3, terms of trade effects have often been criticised as being inconsistent with the idea that Australia is a small country by world standards (that is, unable to influence world prices). It is, however, consistent with the notion that, in at least some international markets, Australian products account for a large proportion of the volume traded, so that greater sales may require a lower price even if all other overseas prices are unaffected.³

The size of the terms of trade effects in the MMRF model is sensitive to the size of the export demand elasticities. These elasticities govern the extent to which greater export volumes come at the expense of price declines — the greater the elasticities, the smaller the price declines required. The central results in this paper assume a value of 10 for all export demand elasticities. As discussed in chapter 3, there is much uncertainty and little agreement among modellers about appropriate values for the export demand elasticities in a model such as MMRF. The practice at the Centre of Policy Studies is to use a value of 5 in year-to-year simulations. In view of the discussion in chapter 3 (see especially box 3.1) — a value of 10 is considered appropriate for long-run projections of the kind used in this study.

4.2 Reference case results

The reference case simulations are used to illustrate and analyse the effects of maintaining the current assistance reductions, introduced following the Commission's 2002 inquiry of automotive assistance (PC 2002). In scenario R1, the automotive tariff is reduced to 5 per cent and the transitional arrangements of the ACIS scheme are completed. The scenario can be decomposed into the effect of reducing the tariff (scenario R2) and the effect of removing ACIS (scenario R3).⁴ The pure reallocation effects are isolated in scenario R4, where national supplies of both capital and labour are fixed.

Economy-wide, industry and jurisdictional results are presented in tables 4.1 to 4.3. All results represent percentage changes in reported variables compared with the policy status quo as represented in the database (which is equivalent to scenario O5

³ This setting is sometimes referred to as the 'almost-small economy' assumption (chapter 3).

⁴ There are small interaction effects, but these are typically not detected until the fifth decimal place.

in table 3.5 (chapter 3)). As anticipated, the modelled net effects of changes in assistance on the economy as a whole are small, reflecting the relatively small size of the automotive industry and relatively small changes in assistance rates that scenario R1 entails.

Economy-wide effects from the model

Reducing the tariff from 10 to 5 per cent and winding up ACIS results in an increase in real GDP, the indicator of economic activity, by up to 0.06 per cent (table 4.1). The slight economic expansion of, and the reallocation of resources across, the economy involves an increase in exports and the attendant reduction in the terms of trade. This reduction in the terms of trade reduces the gains to consumers from the expansion and reallocation effects. The indicator of welfare, real adjusted Gross National Expenditure (GNE), increases by about 0.06 per cent. The following discussion isolates the effect of reducing the tariff and eliminating ACIS.

Table 4.1 **Reference case results — economy-wide**
Percentage changes relative to the database

Scenario	R1	R2	R3	R4
Tariff ^a	to 5%	to 5%	10%	to 5%
ACIS	to 0	Stage 2	to 0	to 0
Other settings				Decomposition closure
National aggregates				
Real adjusted GNE ^b	0.057	0.054	0.002	0.003
Real GDP	0.063	0.059	0.003	0.004
Real private and public consumption	0.002	0.019	-0.018	-0.008
Real investment	0.136	0.130	0.006	-0.006
Export volumes	0.405	0.325	0.082	0.285
Import volumes	0.268	0.256	0.012	0.218
Terms of trade	-0.046	-0.035	-0.011	-0.033
Real exchange rate ^c	0.124	0.103	0.021	0.085
Sectoral aggregates				
Agriculture	0.067	0.046	0.021	0.047
Mining	0.360	0.258	0.103	0.157
Food processing	0.095	0.068	0.027	0.087
Manufacturing	-0.122	-0.075	-0.047	-0.173
Services	0.046	0.049	-0.003	-0.005

^a 'to 5%' means reducing automotive tariffs from 10% to 5%. ^b Real gross national expenditure adjusted for foreign ownership of capital. ^c In the MMRF model, a change in the real exchange rate is interpreted as a change in the nominal exchange rate; a negative sign is interpreted as an appreciation of the \$A.

Source: Commission estimates based on MMRF simulation results.

Effects of the tariff reduction

Reducing the tariff from 10 per cent to 5 per cent leads to an increase in economic activity of 0.06 per cent (or almost all of the total increase from the policy package). By reducing the cost of cars to business users, the lower tariff encourages an expansion of production in non-automotive sectors. As labour is assumed to be fixed nationally, this results in a ‘short-term’ increase in returns to capital, which attracts an inflow of foreign capital to keep the rate of return constant. This is reflected in an increase in investment of 0.13 per cent.

The lower tariff also increases trade. Reduced production costs lower the cost of exports, and export volumes increase by 0.32 per cent. At the same time, users switch from domestically-produced cars and components to cheaper imports and, as the economy expands, import volumes rise by 0.26 per cent.

Increased export volumes lead to a fall in export prices, and the terms of trade fall by 0.04 per cent. This partly offsets the rise in consumption from the positive income effects of cheaper cars, so that real consumption growth is limited to 0.02 per cent. Net benefits as measured by real adjusted GNE increase by 0.05 per cent.

Effects of reducing or removing ACIS

As discussed in box 4.1, the distortionary effects of ACIS are likely to be smaller than those of an equivalent tariff as long as it is possible to raise taxes to fund the subsidy without imposing a distortion greater than that associated with the tariff. This is borne out in the results, with a significantly smaller increase in real GDP resulting from the removal of ACIS. Because the economic effects of ACIS are akin to that of a subsidy on imported inputs and of a production subsidy,⁵ in contrast to reducing tariffs, removing ACIS *increases* the cost of domestically-produced automotive products to consumers and other users. The benefits of removing ACIS are restricted to those resulting from the reallocation of factors of production, and translate into a smaller increase in GDP relative to reducing tariffs. This again drives an increase in the volume of exports (0.08 per cent), with a corresponding fall in the terms of trade (0.01 per cent). This leads to a small decline in real consumption of 0.02 per cent. Net benefits as measured by real adjusted GNE increase fractionally (by 0.002 per cent).

⁵ This is true as long as there is enough tariff revenue from duty paid on automotive imports to cover the ACIS credits.

As anticipated, the aggregate net effect of a production subsidy is smaller than that of a tariff. There are several reasons why the impacts of reducing tariffs are larger than the effects of reducing or removing ACIS.

First, the assistance provided to the industry by the 10 per cent tariff is greater than the assistance provided by ACIS — broadly speaking, the tariff allows automotive producers to raise their (ex-factory) prices by up to 10 per cent, whereas ACIS reduces their production costs by less than 2 per cent. Hence, for the industry, reducing the tariff to 5 per cent has more than double the impact of removing ACIS.

Second, the tariff imposes a tax on buyers of cars (box 4.1). A reduction in the tariff to 5 per cent is estimated to reduce retail car prices by almost 3 per cent, whereas removing ACIS results in a small increase in the price of domestically-produced cars but virtually no reduction in the price of imported ones. Removing ACIS frees up tax revenue, which all else equal allows lower taxes in the economy (whereas reducing the tariff reduces government revenue). However, the beneficial effect of this is less than the economy-wide benefits from reducing the ‘consumer tax’ effect of the tariff. In other words, as modelled, the distortions imposed by the import tax on households and businesses, which use automotive products as intermediate inputs, exceed the distortions imposed by the broader-based taxes used to pay for the subsidy.

In this model, ACIS is assumed to be funded through a tax on factor incomes. This broad-based tax is highly neutral, in that it does not change the relative prices of labour and capital, and therefore generates small deadweight losses. It is, therefore, likely that the model does not fully capture the distorting impacts of the tax system as it actually operates. For this reason, the benefits of reducing or removing ACIS are likely to be underestimated.⁶

Reallocation effects

The allocative effects of the current plan, and their associated terms of trade effects, can be isolated by comparing the results for scenarios R1 and R4. With the capital supply fixed nationally in R4, the size of the resource base remains unchanged. The small increase in real GDP measures the allocative gains in terms of a change in productivity — that is, the increase in output made possible by reallocating the fixed amount of labour and capital available.

⁶ Some estimates put the deadweight costs of taxation at between 20 and 50 cents in the dollar (PC 2008a).

Sectoral effects

As modelled, reducing assistance to the automotive industry leads resources to move out of the automotive industry into other industries. This reallocation is a function of the industries' trade exposure and of the responsiveness of demand in their output markets. More exported-oriented industries face elastic demand for their products and are more able to expand. Conversely, industries which produce mainly for the domestic market are more constrained in their ability to expand output.

As a result, resource gains from reduced automotive assistance are concentrated in the mining sector and some manufacturing industries. The services sector grows almost at the same rate as the economy as a whole to support the expansion of other sectors. Growth of the agricultural sector is contained by the availability of land, and that of the food processing sector is limited by the growth of its main input, agricultural products.

Fixing capital in scenario R4 illustrates how this constraint affects the different sectors — the gains from reducing the cost of automotive products to industries that use them as part of their investment are concentrated in the mining industry. Although removing ACIS increases the cost of automotive products to buyers, it still frees up resources that are available for expanding output — again, mainly in the mining sector.

Effects on the automotive industry

The effects of reducing the tariff and eliminating ACIS on the automotive industry are complicated by:

- the opposing effects of each type of assistance on the price of outputs
- the different effects on assembly and component manufacturing.

Most of the combined assistance is directed to the assembly sector. As a result, this sector bears larger impacts from reduced assistance. Note that constraining capital growth has little impact on the automotive industry, confirming that the closure in scenario R4 is particularly useful for analysing resource reallocation across the economy. In the following, the effects of tariff reduction (scenario R2) and of ACIS (scenario R3) are analysed separately, based on table 4.2.

Table 4.2 Reference case results — automotive industry

Percentage changes relative to the database

Scenario	R1	R2	R3	R4
<i>Tariff^a</i>	<i>to 5%</i>	<i>to 5%</i>	<i>10%</i>	<i>to 5%</i>
<i>ACIS</i>	<i>to 0</i>	<i>Stage 2</i>	<i>to 0</i>	<i>to 0</i>
<i>Other settings</i>				<i>Decomposition closure</i>
Automotive assembly				
Output	-4.600	-2.929	-1.680	-4.558
Employment	-5.468	-3.501	-1.985	-5.378
Domestic sales from domestic production	-5.028	-3.931	-1.117	-4.998
Domestic sales — total	0.029	0.038	-0.009	-0.019
Export volume	-2.860	1.141	-3.970	-2.770
Import volume	3.726	3.151	0.574	3.649
Component manufacturing				
Output	-1.375	-1.159	-0.215	-1.380
Employment	-1.777	-1.532	-0.244	-1.721
Domestic sales from domestic production	-1.613	-1.401	-0.212	-1.622
Domestic sales — total	0.029	0.038	-0.009	-0.019
Export volume	4.117	4.427	-0.298	4.203
Import volume	1.141	1.589	-0.455	1.129

^a 'to 5%' means reducing automotive tariffs from 10% to 5%.

Source: Commission estimates based on MMRF simulation results.

Effects of the tariff reduction

Reducing the tariff (scenario R2) reduces the price of imported cars and components, and encourages users of cars to substitute toward imports. Reducing the tariff rate also reduces uncapped ACIS payments and increases the cost of automotive inputs to the assembly sector. Domestic sales of cars fall by nearly 4 per cent and imports increase by about 3 per cent, in response to a reduction of almost 3 per cent in the price of imports. The assembly sector benefits from the effect of the reduced tariff on the price of imported components. Reduced costs mean that the assembly sector can increase its exports by about 1 per cent.

Component producers use a large amount of imported components as intermediate inputs. As the tariff reduction reduces the cost of one of their main inputs, this reduces the cost of producing components in Australia, relative to the world price. Australian component manufacturers become more competitive and increase their exports by nearly 4.5 per cent.

The combination of effects results in a reduction in output of the assembly sector in the order of 3 per cent, but a much smaller decrease in component output (1.2 per cent). An increase in the capital–labour ratio in the automotive sectors (as is the case in the rest of the economy) means that the decrease in employment exceeds the decrease in output in the automotive industry.

The effect of reducing ACIS

Reducing ACIS (scenario R3) increases the price of assembled automotive products, and the price of components by a negligible amount. As a result, consumers and businesses switch toward imports and exports fall. These effects are larger in the assembly sector than in the component sector because the bulk (67 per cent as modelled) of ACIS assistance is directed to the assembly sector. Imports of components fall as a result of the contraction of the assembly sector and of the domestic components sector itself.

Jurisdictional results

The mechanisms at work at the jurisdictional level are similar when reducing both tariff and ACIS assistance and they are discussed together here, concentrating on scenario R1 (table 4.3). As assistance is reduced, the more automotive-intensive jurisdictions — Victoria and South Australia, and to a lesser extent, New South Wales — lose a small proportion of their labour and capital to other jurisdictions, especially to those that depend on resources and exports for a large part of their activity (Western Australia, Queensland and the Northern Territory).

This movement of population out of the automotive-intensive jurisdictions, reduces demand for local services, in turn reducing aggregate activity (gross state product (GSP)) in these jurisdictions.⁷

In all jurisdictions, however, GSP per person increases. This effect is most prominent in the automotive-intensive jurisdictions, as workers leave the automotive industry for more capital-intensive industries.⁸

⁷ To the extent that labour moves on a temporary basis, this effect would be even smaller than projected here. There is anecdotal evidence that some workers are choosing to travel to high growth areas to work for certain periods, without moving their households. If increased participation were the main source of additional labour in the expanding jurisdictions, the reduction in GSP effect would also be dampened.

⁸ The share of capital in value-added is 0.4 in the automotive industry, and between 0.7 and 0.9 in mining.

Table 4.3 Reference case results — by jurisdiction

Percentage changes relative to the database

<i>Scenario</i>	<i>R1</i>	<i>R2</i>	<i>R3</i>	<i>R4</i>
<i>Tariff^a</i>	<i>to 5%</i>	<i>to 5%</i>	<i>10%</i>	<i>to 5%</i>
<i>ACIS</i>	<i>to 0</i>	<i>Stage 2</i>	<i>to 0</i>	<i>to 0</i>
<i>Other settings</i>				<i>Decomposition closure</i>
Real GSP				
New South Wales	0.111	0.084	0.028	0.079
Victoria	-0.257	-0.145	-0.114	-0.252
Queensland	0.214	0.144	0.071	0.107
South Australia	-0.195	-0.047	-0.148	-0.187
Western Australia	0.446	0.306	0.142	0.230
Tasmania	0.208	0.177	0.031	0.156
Northern Territory	0.302	0.211	0.092	0.200
ACT	-0.037	-0.007	-0.031	-0.085
GSP per person				
New South Wales	0.039	0.044	-0.005	-0.011
Victoria	0.059	0.057	0.002	0.008
Queensland	0.056	0.057	..	-0.006
South Australia	0.072	0.060	0.012	0.021
Western Australia	0.073	0.069	0.004	-0.002
Tasmania	0.058	0.060	-0.002	0.005
Northern Territory	0.062	0.062	..	0.011
ACT	0.023	0.029	-0.006	-0.027

^a 'to 5%' means reducing automotive tariffs from 10% to 5%.

.. greater than 0 and less than 0.0005

Source: Commission estimates based on MMRF simulation results.

Further results are available for the automotive industries by jurisdiction in appendix E. All the mechanisms discussed in this section are also relevant to interpreting the effects in those tables.

4.3 Results for option scenarios and sensitivity tests

Results for the options listed in the task requested of the Commission are outlined and discussed in the following sections. Results for the sensitivity scenarios are briefly summarised in the last section.

As mentioned in chapter 3, some of the options are covered in the analysis of the reference case. The remaining options include:

- three combinations of tariffs and ACIS funding at different levels (scenarios O1, O4 and O7)

- an option in which ACIS is delivered exclusively as grants (scenario O3)
- a scenario in which the Australian dollar appreciates relative to the US dollar (scenario O8).

National and sectoral aggregate results are shown in table 4.4.⁹

Scenarios O1 and O4 illustrate that, in reducing tariffs from 10 to 5 per cent and moving to Stage 3 of ACIS, the latter component of the policy change has a negligible effect on results (recalling that reducing the tariff reduces uncapped ACIS payments).

Table 4.4 Option scenario results — economy-wide

Percentage changes relative to the database

<i>Scenario</i>	<i>O1</i>	<i>O3</i>	<i>O4</i>	<i>O7</i>	<i>O8</i>
<i>Tariff^a</i>	<i>to 5%</i>	<i>to 5%</i>	<i>10%</i>	<i>to 0%</i>	<i>to 5%</i>
<i>ACIS</i>	<i>Stage 3</i>	<i>Stage 2</i>	<i>Stage 3</i>	<i>to 0</i>	<i>Stage 3</i>
<i>Other settings</i>		<i>ACIS as grants</i>			<i>Commodity price increase</i>
National aggregates					
Real adjusted GNE ^b	0.055	0.053	0.001	0.159	1.276
Real GDP	0.061	0.058	0.001	0.176	1.437
Real private and public consumption	0.015	0.031	-0.004	0.048	2.159
Real investment	0.132	0.126	0.002	0.396	3.246
Export volumes	0.346	0.298	0.022	0.974	-2.939
Import volumes	0.259	0.273	0.003	0.750	2.265
Terms of trade	-0.038	-0.031	-0.003	-0.106	3.447
Real exchange rate ^c	0.109	0.092	0.006	0.300	-3.341
Sectoral aggregates					
Agriculture	0.052	0.035	0.006	0.145	-1.559
Mining	0.288	0.198	0.030	0.806	14.466
Food processing	0.075	0.054	0.008	0.214	-3.009
Manufacturing	-0.089	-0.058	-0.014	-0.218	-3.991
Services	0.048	0.052	-0.001	0.149	0.817

^a 'to 5%' means reducing automotive tariffs from 10% to 5%. ^b Real gross national expenditure adjusted for foreign ownership of capital. ^c In the MMRF model, a change in the real exchange rate is interpreted as a change in the nominal exchange rate; a negative sign is interpreted as an appreciation of the \$A.

Source: Commission estimates based on MMRF simulation results.

Scenario O3 illustrates that delivering ACIS as a grant converts it from a relatively complex assistance program, which insulates those that receive the uncapped portion from the effects of the tariff, into a simple production subsidy.

⁹ Other results for these scenarios are found in appendix E (tables E.4 to E.8).

Scenario O8 helps to put into perspective the changes in scenario O1.

Results for these scenarios are discussed next.

Combinations of assistance (O1, O4 and O7)

Scenarios O1, O4 and O7 are different combinations of tariff and ACIS changes. The mechanisms and effects relevant to scenarios O1, O4 and O7 are closely related to those found in the reference scenarios, which are reported in table 4.1.

When moving from Stage 2 to Stage 3, capped ACIS funding is halved, and the economy-wide effects of this change are proportionate to the size of the automotive tariff. For example, if automotive tariffs remain unchanged (scenario O4), halving capped ACIS funding is expected to have a much smaller impact on the economy than in scenario R3, in which ACIS funding is removed completely.

On the other hand, if automotive tariffs are reduced to 5 per cent (scenario O1), the effects of halving capped ACIS funding will be greater than they are in scenario O3, but smaller than they are in scenario R1, in which ACIS is removed completely. It should be noted that the differences between scenarios O1 and O3 are much greater than between scenarios O1 and R1. This is because a tariff reduction has a greater impact on the economy than does reducing an industry subsidy. As illustrated in table 4.1 for the reference scenarios, the economy-wide effects in scenario O1 are almost entirely attributable to the tariff reduction.

The effects of a further tariff reduction can be seen clearly in scenario O7, in which automotive tariffs are reduced to zero (and all other tariffs remain unchanged).¹⁰ This case can be compared with scenario R1, in which automotive tariffs are reduced to 5 per cent. In scenario O7, the removal of all automotive tariffs involves more resources leaving from the automotive sectors to other activities. In particular, the export-oriented industries, notably mining, are projected to attract more resources than in scenario R1. These expanding industries have a higher capital–labour ratio than the automotive industry. As resources move into these capital-intensive industries, the demand for capital increases and the size of the economy expands. Specifically, real GDP increases by 0.18 per cent, compared with 0.06 per cent in scenario R1. As household incomes increase, domestic consumption and expenditure rise — real adjusted GNE increases 0.16 per cent, compared with 0.06 per cent in scenario R1.

¹⁰ Scenario S1 models the elimination of all tariffs.

ACIS delivered as grants (O3)

In scenario O3, all ACIS funding (both capped and uncapped) is treated as a production subsidy and delivered as grants to the automotive sectors. The effects are reported in column 2 of table 4.4.

The effects of scenario O3 can be compared with those of scenario R2 (table 4.1). In scenario R2, capped ACIS is already treated as a production subsidy. However, uncapped ACIS funding is treated as a credit to offset the duty paid by the assembly sector on its imports of car components. This implies that the assembly sector effectively benefits from duty-free imports of car components. A reduction in tariffs on components does not, therefore, increase the assembly sector's demand for these components.

In scenario O3, on the other hand, ACIS funding is used to pay for *any* inputs, not just to offset the industry's tariff bill. When tariffs are reduced, the demand for components by the assembly sector is projected to shift from domestic products to imports. As a result, the output of the components industry will fall more in scenario O3 (appendix E) than in scenario R2. The output of the assembly sector will be higher in scenario R2 than in scenario O3 because the duty-free imports allow the assembly industry to lower its costs, and therefore the price of cars, which stimulates the sales of domestic cars. From an economy-wide perspective, however, delivering ACIS as a pure industry subsidy or partly as an input subsidy makes little difference.

An appreciation of the Australian dollar (O8)

Scenario O8 repeats the experiment in scenario O1 in a setting in which the world prices of Australian mining exports increase by 10 per cent. This scenario is designed to capture the likely effects of a commodity boom in the world market (chapter 3). The exports include coal, oil, gas, iron ore and other mining products. The results are reported in the fifth column of table 4.4.

As expected, an increase in the price of Australia's mining exports has a significant impact on the economy: nearly all the effects reported under scenario O8 are attributable to this. With import prices constant in the model, a rise in the world prices of major exports leads to a projected improvement in the terms of trade of 3.5 per cent. As the purchasing power of domestic income rises, the demand for domestic and imported products increase. This results in a rise in domestic prices and the costs of primary factors, especially labour and land. The Australian dollar is projected to appreciate about 3.3 per cent as a result of combining scenario O1 with the modelled 10 per cent increase in the price of mining exports.

The rising costs of production affect non-mining industries, particularly manufacturing, including automotive sectors. Although real GDP and GNE increase, the outputs of other non-mining industries decline, except services which increases marginally. Despite the expansion in mining exports, exports as a whole decline because the decline in non-mining exports outweighs the increase in mining exports.

Sensitivity scenarios

Various simulations were run by changing settings in scenario R1.¹¹ The first (scenario S1) is a rerun of scenario O7 in an environment in which the tariffs which apply to all other imports (except TCF products) are reduced to zero. Although the general tariff on the imports of most other products is already low (5 per cent or lower), the removal of these tariffs is still projected to generate gains to the economy. As shown in table 4.5, real GDP and GNE increase by 0.3 and 0.27 per cent, respectively.

All other simulations, from scenario S2 to S5 in table 4.5, are based on scenario R1 to test the sensitivity of results in the reference case.

Export demand elasticities set to 5 (scenario S2)

In scenario S2, the elasticities of foreign demand for Australian exports are reduced from 10 (in scenario R1) to 5. As might be anticipated from the discussion in chapter 3, this results in larger terms of trade effects and smaller increases in exports than in scenario R1. For any given rise in exports, world prices are projected to fall further in scenario S2 than in scenario R1. As anticipated, this leads to a slight worsening in the terms of trade, which dampens real adjusted GNE. The differences between the results of scenarios S2 and R1 are small, indicating that outcomes do not change much with reasonable settings of the export demand elasticities.

Endogenous government budget (scenario S3)

In this simulation, the Australian Government budget balance is set as endogenous and all tax rates are fixed. The changes in tariff and ACIS policies lead to a decline in government revenue. Compared with scenario R1, household disposable income increases because income taxes remain unchanged. This results in a rise in real

¹¹ National and sectoral aggregate results for the sensitivity scenarios are shown in table 4.5; all other results can be found in appendix E.

household consumption and savings. However, as government revenue declines, total domestic savings are reduced. To meet the demand for investment determined by the growth in the capital stock, foreign capital inflow needs to increase. As a result, the trade deficit has to increase — exports increase less in scenario S3 than in scenario R1. Overall, there is a small difference in the increases in real GDP and in real adjusted GNE between scenarios S3 and R1. This is due to a decrease in domestic (government) savings (which increases real aggregate consumption) and the attendant increase in foreign capital, as evidenced by an increase in the trade deficit (exports are lower and imports higher in scenario S3 than in scenario R1).

Table 4.5 Sensitivity simulation results — economy-wide

Percentage changes relative to the database

<i>Scenario</i>	<i>S1</i>	<i>S2</i>	<i>S3</i>	<i>S4</i>	<i>S5</i>
<i>Tariff^a</i>	<i>to 0%</i>	<i>to 5%</i>	<i>to 5%</i>	<i>to 5%</i>	<i>to 5%</i>
<i>ACIS</i>	<i>to 0</i>	<i>to 0</i>	<i>to 0</i>	<i>to 0</i>	<i>to 0</i>
<i>Other settings</i>	<i>General tariff to 0%</i>	<i>Export elasticity of 5</i>	<i>Endogenous budget</i>	<i>Rate of return closure</i>	<i>Short run closure</i>
National aggregates					
Real adjusted GNE ^b	0.268	0.051	0.063	0.011	..
Real GDP	0.297	0.054	0.067	0.014	..
Real private and public consumption	0.100	-0.011	0.093	-0.066	-0.062
Real investment	0.675	0.118	0.141	0.023	0.000 ^d
Export volumes	1.511	0.411	0.116	0.505	0.415
Import volumes	1.206	0.240	0.299	0.208	0.169
Terms of trade	-0.159	-0.084	-0.011	-0.059	-0.051
Real exchange rate ^c	0.381	0.172	0.029	0.157	0.203
Sectoral aggregates					
Agriculture	0.176	0.081	0.031	0.075	0.061
Mining	1.352	0.325	0.222	0.293	0.021
Food processing	0.194	0.085	0.055	0.115	0.100
Manufacturing	-0.183	-0.115	-0.184	-0.120	-0.091
Services	0.257	0.038	0.064	-0.005	..

^a 'to 5%' means reducing automotive tariffs from 10% to 5%. ^b Real gross national expenditure adjusted for foreign ownership of capital. ^c In the MMRF model, a change in the real exchange rate is interpreted as a change in the nominal exchange rate; a negative sign is interpreted as an appreciation of the \$. ^d Exactly zero.

.. greater than 0 and less than 0.0005

Source: Commission estimates based on MMRF simulation results.

Increasing rate of return of capital (scenario S4)

This simulation is designed to test the assumption that capital can readily be obtained from foreign capital markets at a fixed rate of return. As might be expected, if the cost of borrowing capital rises as the demand for capital increases, the expansion of economic activities slows relative to scenario R1. Real GDP is projected to rise only 0.01 per cent in S4 (table 4.5), compared with 0.06 per cent in scenario R1 (table 4.1). When the cost of borrowing from abroad increases, the expansion of capital is curtailed, as evidenced by a smaller increase in investment.

'Short-run' closure (scenario S5)

The last simulation is used to check the performance of the model when labour mobility is constrained between industries within each jurisdiction and capital is fixed at the industry level. This closure can be interpreted as representing short-run effects, before most adjustments can occur. As capital is immobile, labour is the only factor that can be reallocated, but only within each jurisdiction. This restricted mobility of labour still produces a small efficiency gain when tariffs are reduced from 10 per cent to 5 per cent and ACIS is wound up. However, household real consumption declines as the increase in income tax required to balance the government budget, outweighs the small rise in labour income.

Both scenario S4 and scenario S5 show that the simulation results are determined, to a large extent, by the expansion effect of the modelled reductions in assistance, which are associated with the increase in capital stock required to match the reallocation of labour across the economy.

A 1 per cent improvement in productivity in the automotive sectors

The Commission conducted a simple illustrative productivity simulation to compare results with other scenarios. In this simulation, the automotive industry was assumed to achieve a 1 per cent improvement in the productivity of its labour and capital. Economy-wide results are found in table 4.6 and industry results in table 4.7.

Table 4.6 Productivity simulation results – economy-wide

Percentage changes relative to the database

	<i>Changes</i>
Real adjusted GNE ^a	0.008
Real GDP	0.007
Real private and public consumption	0.012

^a Real gross national expenditure adjusted for foreign ownership of capital.

Source: Commission estimates based on MMRF simulation results.

Table 4.7 Productivity simulation results — automotive industry

Percentage changes relative to the database

	<i>Car assembly</i>	<i>Component manufacturing</i>
Output	0.597	0.387
Employment	-0.486	-0.661
Domestic sales from domestic production	0.395	0.326
Domestic sales — total	0.011	0.011
Export volume	1.422	1.804
Import volume	-0.197	-0.097

Source: Commission estimates based on MMRF simulation results.

The improvement in productivity in the automotive industry increases income (real GDP) and disposable income, as evidenced by an increase in consumption.

The productivity improvement reduces the price of domestic products and improves their competitiveness. This is evidenced by increases in output and exports of cars and components. This occurs to the detriment of imports as buyers and industries, which use cars and components substitute away from imports and toward local products. As might be anticipated, notwithstanding the increase in output, the productivity improvement also reduces employment in the automotive industry, which makes this labour available to other industries.