PRODUCTIVITY COMMISSION

Review of Australia's General Tariff Arrangements

Supplement to Inquiry Report

Modelling the Effects of Removing General Tariffs

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Abbreviations and explanations

ABS	Australian Bureau of Statistics
AIG	Australian Industry Group
ANZSIC	Australian and New Zealand Standard Industrial Classification
ASGC	Australian Standard Geographical Classification
ASIC	Australian Standard Industrial Classification
cif	Cost, insurance, freight
CoPS	Centre of Policy Studies, Monash University
CTCO	Commercial Tariff Concession Order
DPR	Dixon, Parmenter and Rimmer
EPAC	Economic Planning Advisory Council
FBT	Food, beverages and tobacco
fob	free on board
GDP	Gross domestic product
IC	Industry Commission
IO	Input-output
LILI	Labour input loss index
NAIRU	Non-accelerating inflation rate of unemployment
PACIA	Plastics and Chemicals Industry Association
PAYE	Pay as you earn
PC	Productivity Commission
PMV	Passenger motor vehicles
TCF	Textiles, clothing and footwear
TCO	Tariff Concession Orders
TCS	Tariff Concession System
TEXCO	Tariff Export Concession

1 Modelling the effects of removing general tariffs

1.1 Introduction

The terms of reference for the general review of tariffs requested that the Commission, among other things, report on:

- the costs and benefits to Australian consumers, industries and their employees, and the general community, of a reduction of all general tariff rates under reference; and
- take into account the impact of microeconomic reform and the pace of structural adjustment on Australian industry.

To assist in addressing these issues, the Commission has undertaken a quantitative analysis of the effects over time of removing the tariffs under reference. The analysis first examines the national and industry effects of removing tariffs, relative to the other factors likely to affect the Australian economy over time. It then disaggregates the effects of removing tariffs down to the regional level. Finally, the analysis examines the additional impact of tariff changes on the cost of on-going adjustment in labour markets. The results together provide an indication of the impact of tariff reductions on the size and structure of Australia's industries and regions.

The tariffs under reference include all line items in the Australian Customs Tariff with a scheduled general rate of duty of 5 per cent or less except TCF and PMV plan items. The items under review comprise about 35 per cent of line items and a similar share of imports by value (appendix B). A further 45 per cent of line items are duty free. Selected TCF, PMV and dairy industry items have general tariff rates above 5 per cent and are also not under reference. According to currently legislated phasing arrangements, the rates for many of these items will remain above 5 per cent until at least 2005.

The quantitative analysis examines the implications of removing tariffs on items under reference, while leaving tariffs on items not under reference in place. Although tariff reductions can potentially encourage domestic resources into more

efficient uses, there is a risk that when only some tariffs are removed, while others remain, resources will be attracted into less efficient uses in the areas still receiving protection from imports. The analysis presented here takes these effects into account. It does not take into account any possible induced increase in anti-dumping activity, nor the effects of potentially significant non-tariff barriers to trade, especially in services.

The quantitative analysis is dynamic — it looks at the effects year after year once the tariffs under reference are removed. It does this in two steps. First, it traces out a year-on-year growth path for the economy, taking into account all the factors likely to affect the economy, but without the removal of tariffs under reference. This is called the base case. It then traces out a second growth path, one that includes the removal of tariffs under reference. This is called the policy simulation. The effects of removing the tariffs on items under reference are given by the cumulative differences between these two growth paths.

There are several reasons why it is important to have an explicit base case scenario from which to evaluate the effects of removing tariffs under reference.

One reason is that the labour market adjustment costs associated with removing tariffs under reference can depend on the shape of this underlying growth path. While it is likely that removing tariffs under reference would slow employment growth in some industries *relative* to what it would otherwise have been, the adjustment costs would depend on whether this translated into positive or negative *actual* growth over time. For example, adjustment costs are likely to be higher if some industries have to lay off workers, rather than merely slow the rate at which they employ additional workers.

It is also important to have an explicit underlying growth path when considering the effects of removing tariffs under reference, relative to the effects of using other means to recover the same revenue. Imports of some of the items under reference, such as electronic equipment and household appliances, have been growing relatively rapidly over time. If their tariff revenue was replaced using a tax base that has been growing more slowly, the replacement tax *rate* may need to rise over time.

Because the tariffs on items under reference are small, the effects of removing them can be expected to be small. The complexities of the model are such that, with small changes, it is especially difficult to see which of the many possible model mechanisms determine the estimated effects. With larger changes, it is typically easier to see which two or three mechanisms dominate. For small changes, the ‘signal to noise’ ratio is very low. This needs to be borne in mind when interpreting the results presented here.

The Commission presented a preliminary version of this quantitative analysis to three formal referees and held a modelling workshop in early April 2000 with the referees and other interested inquiry participants. The analysis of national, regional and industry effects presented at that workshop was based on comparative static methodology, giving a long-run snapshot of how the economy would differ from what it otherwise would be as a result of removing tariffs under reference. The main analysis was not year-on-year, and it did not include an explicit underlying growth path, although the assessment of labour market adjustment costs was based on a preliminary dynamic analysis. One of the suggestions made at the workshop was that all the analysis should be done in a dynamic setting. Another comment was that some of the model parameter settings the Commission had chosen for its long-run comparative static analysis would have been more appropriate in a year-on-year dynamic setting. The analysis presented here meets those concerns. Other relevant comments made by the workshop participants are noted later in this report.

The Commission presented the revised dynamic analysis as a supplement to the draft report. It received some additional comments in response. These are also discussed later in this report.

1.2 Model framework

The Commission has used the standard MONASH model to quantify the effects of removing tariffs under reference (Box 1.1). In the analysis for the modelling workshop, a slightly amended version of the model was used in comparative static mode. For the analysis presented here, the standard model is run dynamically.

The MONASH model has a detailed commodity and industry structure appropriate to the analysis of the effects of tariff reform. In addition, it is the only model that goes beyond the State level to provide comprehensive regional results.

The model contains 113 industries and 115 commodities, of which 66 industries and commodities fall within the manufacturing sector. To enable a broad overview of the effects of change on industry structure to be provided, results are aggregated to four industry sectors — agriculture, mining, manufacturing and services. In addition, the results for 66 MONASH manufacturing industries are aggregated to 11 Australian and New Zealand Standard Industry Classification (ANZSIC)-based industry subdivisions to provide a broad view of results for the manufacturing sector. The analysis is nevertheless undertaken at the full 113-industry level. Details of the MONASH industries, manufacturing subdivisions and industry sectors adopted in this study are provided in appendix A. Appendix A also provides a link between the industry classification adopted and ANZSIC (ABS Cat. no. 1292.0).

Box 1.1 **Documentation on the MONASH model**

The following papers give detailed information on how the MONASH model is structured and used for policy analysis, forecasting, historical analysis and regional analysis. Full documentation is currently being prepared and its release is forthcoming.

Overview of the MONASH model

Adams, P., Dixon, P., McDonald, D., Meagher, G. and Parmenter, B. 1994, 'Forecasts for the Australian economy using the MONASH model', *International Journal of Forecasting*, vol. 10, no. 4, pp. 557–71.

Parmenter, B. 1995, 'Forecasting and policy analysis with the MONASH model', Paper prepared for the International Symposium on Economic Modelling, Bologna, Italy, 19–21 July.

Behavioural theory in detail (excluding capital and labour adjustment)

Dixon, P., Parmenter, B., Sutton, J. and Vincent, D. 1982, *ORANI: a Multisectoral Model of the Australian Economy*, North-Holland, Amsterdam.

Capital accumulation theory

Dixon, P. and Malakellis, M. 1996, 'Investment behaviour in the MONASH model of the Australian economy', in Vlacic, L., Nguyen, T. and Cecez-Kecemanovic, D. (eds), *Modelling and Control of National and Regional Economies 1995*, Pergamon, Oxford.

Historical analysis

Dixon, P. and McDonald, D. 1993, *An Explanation of Structural Changes in the Australian Economy: 1986-87 to 1990-91*, Background Paper no. 29, Economic Planning and Advisory Commission, Canberra, June.

Forecasting

CoPS (Centre of Policy Studies) 1996, *Guide to Growth,* CoPS, Monash University, Melbourne.

Dixon, P., Parmenter, B. and Rimmer, M. 1998, *Forecasting and Policy Analysis with a Dynamic CGE model of Australia*, CoPS, Monash University.

Policy analysis

Industry Commission 1997b, *The Textiles, Clothing and Footwear Industries*, Industry Commission, Report no. 59, AGPS, Canberra.

Regional analysis

Adams, P. and Dixon, P. 1995, 'Prospects for Australian industries, States and regions: 1993-94 to 2001-02', *Australian Bulletin of Labour*, vol. 21, no. 2, pp. 87–108.

Productivity Commission 1999, 'Modelling the regional impacts of National Competition Policy reforms', Supplement to Inquiry Report, *Impact of Competition Policy Reforms on Rural and Regional Australia*, Canberra, September.

The MONASH model can provide results for each time period down to 57 'statistical divisions', using a regional disaggregation facility. This regional facility adopts a 'tops down' approach. First, national results are generated for each industry. These results are then subdivided into State effects (based on the industry mix of each State's activity), and further subdivided to give impacts at the statistical division level (again based on the industry mix of each statistical division's activity).

The regional classification is based on the statistical division classification of the Australian Standard Geographic Classification (ASGC, ABS Cat. no. 1216.0) in which a division is defined to be:

> a relatively homogeneous region characterised by identifiable social and economic links between inhabitants and between the economic units within the region, under the unifying influence of one or more major towns or cities. (ABS 1996, p.15)

Because regions in the model contain a major urban conurbation, most contain a substantial, but varying, mix of primary, manufacturing and service activities. The effects of tariff reductions and changing general economic conditions on any one region would reflect its overall activity mix and the prospects of individual activities.

A key aspect of the model's behaviour is the way in which capital and labour move between industries in response to changes in economic conditions.

When the MONASH model is run dynamically, the size of the capital stock and its allocation between industries can change from year to year, but only relatively slowly. At one extreme, if the after-tax rate of return on capital in an industry falls sufficiently, investment can cease altogether, but the capital stock would fall only at the rate of depreciation. At the other extreme, the after-tax rate of return in an industry may rise substantially, but investors are assumed to be cautious about how much additional investment they would devote to that industry in response, placing an upper limit on its rate of capital growth. Thus investment in each industry responds to after-tax rates of return, but in such a way that capital stocks adjust slowly.[1] Eventually, the adjustments to industry capital stocks would erode divergences in after-tax rates of return.

The current version of MONASH also keeps track of whether domestic residents or foreigners finance the growth in capital stocks. An increased deficit in the current

[1] In the analysis presented at the workshop, foreign investors were assumed to face a destination-based tax system in their own country and hence respond to pre-tax rates of return in Australia. The current treatment is more conservative, and is in line with suggestions made at the modelling workshop.

account is associated with a net capital inflow from abroad, and a subsequent increase in interest and dividend payments to foreigners. This has implications both for the net wealth of Australian residents, and for their disposable incomes. The MONASH model measures household disposable income as GDP at factor cost (ie GDP net of all indirect tax payments), less net interest and dividend payments to foreigners, plus transfers (such as unemployment benefits) from governments to households, minus transfers of direct tax (eg PAYE and company income tax) from households to governments. Clearly, household disposable income would be affected, not just by the effects of tariff removal on production and hence GDP, but also by any tax changes needed to recover the lost tariff revenue. As noted below, in the policy simulation, household expenditure is assumed to move in line with household disposable income.

Removing tariffs under reference would also be likely to entail a relocation of jobs between industries and regions. This study assumes that tariff changes reshuffle jobs, but do not affect the level of aggregate employment in any period — this remains the same as in the base case. Instead, removing tariffs under reference is assumed to affect the economy-wide real wage, while industry profits also adjust. The change in profits relative to the overall wage provides signals for the relocation of available labour between activities.

In this environment, therefore, the aggregate labour market effects of tariff reductions are realised through changes in the real wage rather than national employment. The view abstracts from cyclical factors and sees aggregate employment as being determined primarily by labour market, social or training policies that would affect the prevailing 'non-accelerating inflation rate of unemployment' (NAIRU). The current treatment differs from the standard MONASH treatment, in which aggregate employment can rise in the short term in response to tariff cuts.

The job relocations associated with tariff cuts (as for any policy change) can offer benefits to some workers, but could pose adjustment problems for others. A comparison of the estimated effects of tariff reductions with actual employment changes from the mid-1980s to the mid-1990s provides an indication of the likely adjustment pressures induced by removing tariffs under reference.

An index of labour market adjustment costs (the so-called LILI, or labour input loss index) developed for the MONASH model (Dixon, Parmenter and Rimmer 1997) has also been used to examine the issue of labour market adjustment in more detail. This index provides information about the likely additional impact of tariff reductions on ongoing labour market adjustment. The net impact of the tariff reductions on adjustment costs is measured by the difference between the adjustment costs in the base case and the policy simulation.

In the version of the MONASH model presented at the modelling workshop, the Commission had made some refinements to the way in which imports and exports were modelled. These refinements were made so that the model could track historical changes in import and export volumes more accurately in an annual average, comparative static setting. In particular, recent Commission studies had suggested that import volumes were more sensitive to relative price changes than had been assumed in the standard MONASH model. The approach adopted in the modelling workshop generalised the approaches adopted in IC (1997a,b) and involved the adoption of higher import substitution ('Armington') elasticities than implied by the simple application of standard MONASH values. The revised approach to modelling imports and exports attracted favourable comment from one of the referees at the modelling workshop.

However, these refinements have not been adopted in the current exercise. The dynamic analysis takes as its base case the latest MONASH forward projections for the Australian economy (Adams, Dixon, McDonald, Meagher and Rimmer 1999), which are in turn based on historical projections. If the Commission's preferred trade specification had been adopted, both the historical and the forward projections would need to have been revised. Revising the historical projections in particular is a detailed exercise and has not been possible in the time available since the modelling workshop.[2] One implication is that in the current economic analysis, the consequences for the terms of trade of removing tariffs under reference are likely to be materially over-stated.

The current dynamic analysis nevertheless retains a feature presented at the modelling workshop, which attempts to capture the dynamic links between tariff reductions and manufacturing industry productivity growth. The Commission has drawn on an econometric study of the relationship between tariff changes and manufacturing industry productivity growth over three decades from the 1960s to the 1990s (appendix C). Thus when tariffs on items under reference are removed in the model, a corresponding increase in productivity is introduced into the affected industries. This allows for the likelihood that some producers would respond to the increased competition imposed by tariff reductions by improving productivity rather than by vacating the activity in favour of imports. Other research undertaken in Australia and overseas lends support to such an effect.

At the modelling workshop, a question was raised as to whether the effects of large past tariff changes on productivity should be extrapolated in a linear fashion. The data used in the original study were not rich enough to allow a detailed study of this

[2] The Commission was able to confirm that revising the forward projections without revising the underlying historical projections (from which projections of future productivity improvements were obtained) led to unstable results because of the internal inconsistencies.

issue, nor of the dynamic path of any productivity changes. However, the original study did find that effects estimated over the latter half of the sample period were similar to those estimated for the period as a whole.

At the modelling workshop, it was also suggested that productivity changes might be driven more by changes in effective rather than nominal tariff rates. Again, the original study did not address this issue in detail. However, over the period of estimation, there was a strong positive correlation between changes in nominal and effective rates.

Finally, at the workshop, it was suggested that if there were any 'cold shower' effects from greater import competition leading to productivity improvements in the areas under reference, there could also be 'warm sun' effects resulting in a decline in productivity in areas such as TCF and PMV. This would be consistent with productivity changes being linked to changes in effective rather than nominal rates. As noted, changes in nominal and effective rates have tended to be closely linked historically. However, appendix B shows that there would be some relative movement in nominal and effective rates as a result of removing tariffs on items under reference. In the absence of evidence on the size of any 'warm sun' effects, this study presents results on the effects of removing tariffs on items under reference, both with and without 'cold shower' effects improving productivity in the affected areas. The cold shower effects are perhaps best viewed as effects of greater integration of Australia into the world economy, rather than just the reduction of tariffs.

In commenting on the draft report, AIG (sub. D122, p. 1) noted that 'if taken to its logical conclusion, the Commission's modelling approach could imply that the best policy is not merely to eliminate tariffs but to subsidise imports substantially — a farcical result'. If substantial import subsidies continued to yield the same productivity improvements as past tariff reductions, the outcome identified by AIG is conceivable. However, this is not a logical conclusion of the Commission's analysis, but an unwarranted extrapolation of an econometric result to a situation widely outside in-sample experience. In the latter half of the sample period, the nominal rate of assistance to output in manufacturing (a measure that includes quotas as well as tariffs) fell from 13 per cent to 5 per cent. For the goods under reference in this inquiry (ie excluding TCF and PMV), the reduction would have been from something less than 13 per cent to something less than 5 per cent. The tariff reductions considered in this inquiry are reasonably close to this — substantial import subsidies are not. If, as noted, the cold shower effects come from greater integration into the world economy, it would not be expected that any further substantial productivity gains would be reaped once tariffs were reduced

sufficiently (and other supporting policies implemented) so that integration was achieved.

Economic environment for the policy simulation

Some of the key assumptions about the economic environment for the policy simulation were spelt out above. In particular, it is assumed that investment in each industry can deviate from its base case value in response to deviations in after-tax rates of return. This causes deviations from the base case in industry capital stocks, in a direction that would eventually eliminate the deviations in industry rates of return.

It is also assumed that aggregate employment in the policy simulation is the same as in the base case.

In a year-on-year dynamic model, households can be made better off in one of two ways — by achieving a higher level of real consumption in the periods under consideration, or by accumulating more real wealth (which would allow higher consumption beyond the periods under consideration). Thus, if changes in real household consumption are to be used as a key indicator of overall changes in economic wellbeing in a period, account also needs to be taken of changes in real wealth over that period.

In the policy simulation, real household consumption expenditure is allowed to diverge from its base case value by an amount reflecting divergences in real disposable income of Australian households. Removing tariffs on items under reference can affect household disposable incomes, and hence real consumption, in a number of ways. Removing tariffs (and replacing the lost tariff revenue in some other way) can affect the level of *production* (or GDP) in the economy by:

- affecting rates of return, investment, and hence the capital base of the economy;
- changing the allocative efficiency of resource use; and
- possibly inducing productivity improvements in the industries undergoing the tariff change.

The net effect on households also depends on how these changes in production translate into changes in *real household disposable income*. This depends on:

- whether any increase in the capital base is financed primarily by foreigners;
- whether the lost tariff revenue is replaced by increases in other taxes paid by households; and

- whether there are changes in the prices of goods consumed by households relative to other prices in the economy.

In modelling the removal of tariffs under reference, an assumption needs to be made about how the government responds to the loss of tariff revenue. One possible assumption is that some other tax is increased, or that government spending is reduced, by an amount required to maintain fiscal balance. Since households are already assumed to maintain a constant savings rate, maintenance of fiscal balance implies that the national savings rate is held roughly constant.

But one important consequence of removing tariffs on items under reference is that the replacement cost of many capital goods falls. As is shown in appendix B, this is because some of the more important items under reference are agricultural, mining, manufacturing and construction machinery and electronic equipment, the prices of which fall as the tariffs are removed. Thus from the same amount of savings, Australians can accumulate additional wealth in the form of more real physical capital.

This means that with a fall in the cost of investment goods, the national savings rate does not have to be held exactly constant in order to preserve the real wealth of Australians. In the current analysis, it is assumed instead that the government budget moves towards deficit slightly over time, by an amount sufficient to ensure that the real wealth owned by Australians is the same as in the base case by the ninth year after tariffs are removed. This allows the increase in real household consumption in that year to be used alone as an accurate indicator of changes in economic wellbeing. This assumption is somewhat arbitrary, but it makes the analysis easier, by avoiding the need to combine two different indicators of economic wellbeing into one.

Although the government budget is allowed to move slightly towards deficit over time, to take account of the fall in the price of capital goods and its impact on real wealth, it does not move towards deficit to the full extent of the loss in tariff revenue. Two assumptions are made about the way in which the difference is made up and the results for each are presented in the subsequent analysis:

- by increasing the income tax rate on labour income; or
- by reducing government consumption spending (which in the first option is treated as being the same as in the base case).

Because the modelling of direct taxes in MONASH is relatively rudimentary, it is not possible to have a realistic income tax replacement option. For example, taxes on labour and capital income in MONASH are treated as being proportional rather than progressive. There is no straightforward correspondence between taxes on

labour and capital income and the real-world instruments of PAYE and company income taxes. And there is no treatment in the model of dividend imputation. Without this last feature, adjusting taxes on capital income in MONASH is particularly problematic.

Instead, the first option should be seen more abstractly as representing a relatively efficient (though not necessarily realistic) way of making up the lost tariff revenue. The labour income tax option is efficient *in the model* because of the assumption that aggregate employment is the same in the policy simulation as in the base case. Without a behavioural response to higher labour income tax rates, there are no adverse efficiency effects.[3]

In the second option, reducing government consumption expenditure makes up for the loss of tariff revenue. Under this option, any increase in real household consumption expenditure afforded by removing tariffs on items under reference would have to be discounted by the fall in government expenditure, and its likely value to consumers.

1.3 National effects of tariff reductions

Real GDP

In order to model the effects of removing tariffs on items under reference, a detailed investigation was undertaken of the effects of that removal on the landed duty paid price of imports. This analysis controlled for the effect of tariff concessions on import prices, made special provision for duty levied by ad valorem and specific rate procedures, and excluded excise duties levied on imports (appendix B). The policy shocks to the MONASH model are based on this investigation, in which the import price effects were built up from the tariff line item level.

For the draft report, 1996-97 import values were used as weights to aggregate the tariff line items, and the shocks to the MONASH model were the estimated import price effects based on these weights. For the final report, the aggregation of tariff line items and derivation of import price effects has been updated in appendix B using 1998-99 import values. The results are sufficiently close to those in the draft

[3] An alternative option might have been to make up the tariff revenue using a consumption tax. This would be a two-step exercise. First, the existing wholesale sales taxes in the model would be replaced by a uniform retail tax on household consumption. Second, this uniform retail tax rate would be raised to replace the tariff revenue lost from removing the tariffs on items under reference. Since the first step is time-consuming, this option has not been considered.

report that the MONASH model analysis has not been updated, and continues to be based on the estimated import price effects reported in the draft report. The MONASH model analysis undertaken by the Commission thus remains strictly comparable with additional analysis done for the Commission by the Centre of Policy Studies, reported later in this supplement.

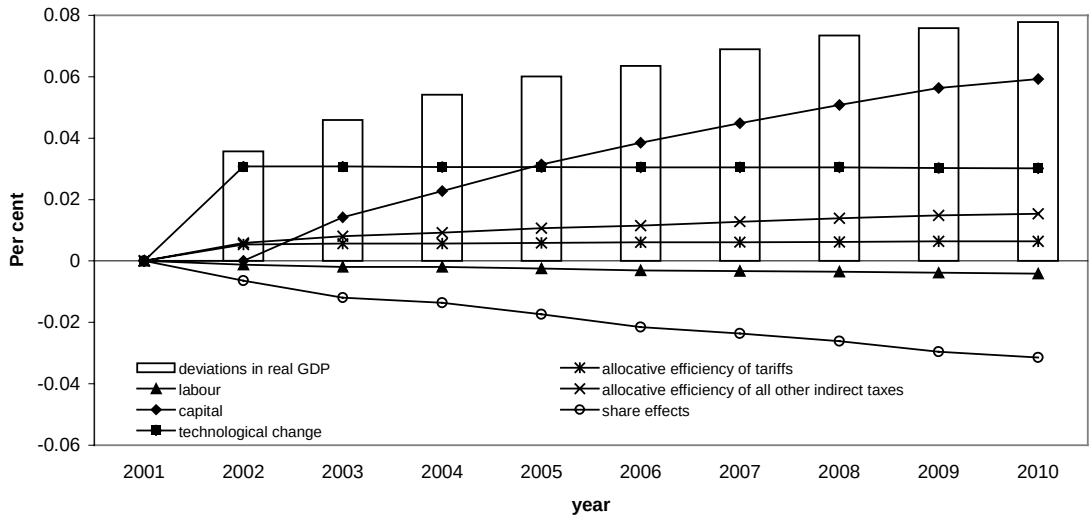
Figure 1.1 shows the effects on real GDP and its components estimated to result from removal of the tariffs on items under reference (and making up revenue by increasing income taxes on labour income). The effects are measured by the cumulative deviations in each item from its base case value. The policy change is assumed to take full effect in 2002 (the first full year of implementation), and the results are shown for each subsequent year up to 2010.

In principle, the factors driving measured changes in real GDP are changes in labour and capital inputs, changes in allocative efficiency (measuring changes in the burden of indirect taxes, including tariffs), changes in productivity, and so-called 'share' or composition effects.[4] The share effects arise because any change in the composition of the economy towards industries that experience more rapid growth in labour inputs, capital inputs, indirect tax revenue or productivity will raise the overall growth rate of real GDP as measured.

However, as explained below, there are deficiencies in the indexing method used to construct the overall measure of real GDP (and other macroeconomic aggregates such as real household consumption) from individual components of economic activity. Although it is a Divisia index measure that uses the same constantly updated weights as used by the ABS, it can be misleading in the sense that it can report changes in aggregate economic activity, even when there are no changes in the individual components. As a result, such index measures should be viewed with caution — the share effects in particular need not have implications for economic wellbeing, and should not be used as a guide to economic policy.

[4] The allocative efficiency effects associated with direct taxes on capital and labour income are included in the measured contributions of changes in capital and labour inputs. However, as argued earlier, changes in direct tax rates on labour income should have no efficiency effects *in the model* — any increase in labour income tax revenue as a result of higher income tax rates should be exactly offset by a reduction in after-tax labour income.

Figure 1.1 **Real GDP and its decomposition**
(percentage deviations from base case values)



Data source: PC estimates, based on MONASH model dynamic simulation.

The vertical bars in figure 1.1 show that measured real GDP is estimated to rise (ie is higher than in the base case) in 2002 by a small amount. In this period of implementation, there is no increase in the real capital stock, since this is governed by investment decisions in the previous period. Nor is there an increase in employment, since by assumption that is held at its base case value in every period. Instead, the first period increase in real GDP is due primarily to the improvement in productivity assumed to accompany the tariff removal in the affected industries. There is also a small improvement in allocative efficiency associated with the tariff removal itself. Because this effect is measured across all tariffs, and not just those under reference, the net positive contribution shows that the negative allocative efficiency effects associated with the increase in effective protection to TCF and PMV do not offset the positive effects of eliminating tariffs on items under reference. There is a further small improvement in allocative efficiency associated with an induced increase in the use of commodities subject to existing excise and wholesale sales taxes. For example, sales of household appliances increase as the tariff on them is removed. Offsetting these positive effects in part is a negative contribution from share effects, primarily due to a compositional shift away from tariff revenue on rapidly growing imports towards other sources of indirect tax revenue.

In subsequent periods, measured real GDP continues to rise, but at a slower rate than in the period of implementation. These further increases in real GDP come primarily from induced increases in the capital stock, encouraged because the

removal of tariffs on items under reference reduces the prices of capital goods. Growing negative share effects offset the effect of these induced increases in the capital stock, but the estimated net result is still further increases in real GDP.[5]

In the period of implementation, the estimated deviation in measured real GDP from the base case forecast is equivalent to 0.04 per cent, or about $240 million, measured in current dollars. By 2010 (the last year shown), the deviation in real GDP from base is 0.08 per cent or $480 million, also measured in current dollars. These estimates are based on a potentially misleading Divisia index measure of aggregate economic activity, but as explained below, indications are that this latter figure could be an underestimate of the effects in 2010.

Real household consumption

Figure 1.2 shows the path of measured real household consumption. For the first four periods, this is below its base case value. However, in these periods, the real wealth of Australian residents is also above its value in the base case (because of the decline in the cost of capital goods and the associated increase in investment), so that real consumption is not a complete indicator of the effects on economic wellbeing. The government budget position is assumed to ease gradually over time so that by 2010, the real wealth of Australian residents is the same as it was in the base case. This is because the gradual easing in labour income tax rates raises the real disposable income of Australian households. Thus, in 2010, real household consumption is a measure of the pure consumption gain available to Australians from eliminating tariffs on items under reference.

This pure consumption gain in 2010 is small — 0.04 per cent, or $140 million in current dollars — but it would be sustained beyond 2010 (with wealth continuing at its base case value). In percentage terms, it is less than the last period's gain in real GDP. A number of steps are required to translate the estimated increase in real GDP into the associated increase in real household consumption.

One component contributing negatively is an estimated decline in the terms of trade. In the MONASH model, Australia is assumed to be small in the market for its imports, but to have some market power in the markets for its exports. When the tariff reduction lowers domestic costs and improves the competitiveness of at least some exporters, the expansion in export volumes comes at the cost of a decline in the prices that foreigners are willing to pay. The terms of trade are estimated to decline by 0.11 per cent in 2010, contributing a 0.05 percentage point decline in

5 The decomposition is approximate, and the components do not add exactly to the GDP total.

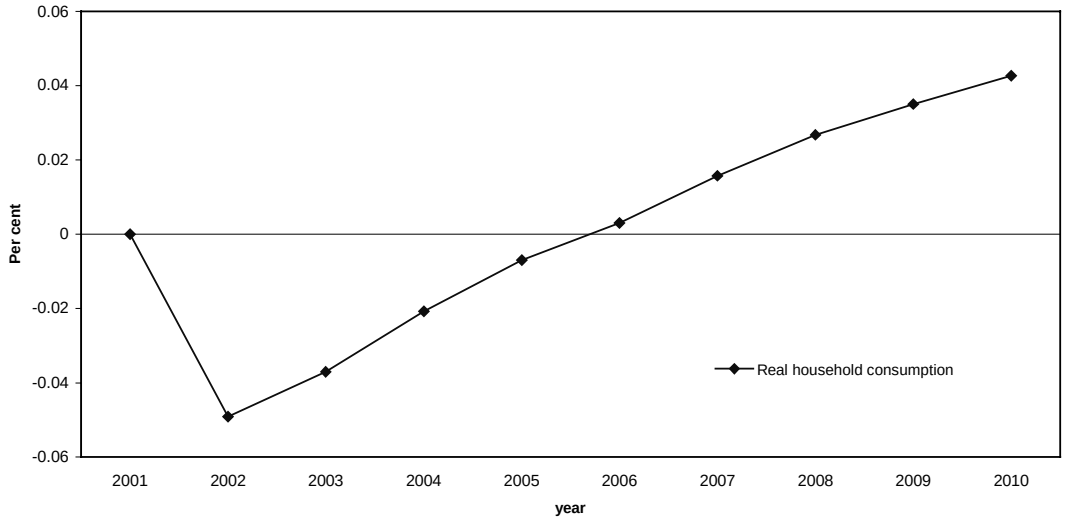
household consumption.[6] Given that the trade parameters in the standard MONASH model appear to be too small, this negative terms of trade contribution is materially overstated.

In addition, not all real GDP accrues to Australian residents. Indeed, by assumption, the real wealth of Australians in the last period is the same as it was in the base case. Since foreigners must have financed the capital additions, they earn most of the extra income. The only exception is the capital income tax that the government obtains from the extra profits repatriated to foreigners.

Offsetting this, there is the additional consumption that can be financed from changes in wealth. By assumption, wealth in the last period declines to its value in the base case, and this decline in wealth can be used, along with disposable income, to finance consumption in the last period.

These adjustments to measured real GDP only approximate the measured increase in real consumption. One reason is the unreliability of these Divisia index measures of real GDP and real household consumption.

Figure 1.2 **Response of real household consumption**
(percentage deviation from base case value)



Data source: PC estimates based on MONASH model dynamic simulation.

6 This last number is calculated as the decline in the terms of trade, multiplied by the export share in GDP, divided by the household consumption share in GDP.

The Commission asked the Centre of Policy Studies (CoPS) at Monash University to investigate the extent of this unreliability problem. In a paper, available by request from the Commission, Dixon and Rimmer (2000) used the following technique to compute non-Divisia measures of real GDP and real household consumption. They used the base case position of the economy in the last period as the starting point for a comparative static simulation of the effects of removing tariffs under reference. This gave a direct measure of the extent of the difference between the base case and the policy case in the last period, one that was not dependent on the particular path of economic variables in the intervening periods. The comparative static simulation used the same tariff shocks and induced productivity increases as in the dynamic simulation, but also introduced as shocks the induced deviations from base in capital stocks and net foreign assets that came from the dynamic simulation. As a result of these three shocks, the comparative static measure of the gain in real GDP was 0.12 per cent and the associated gain in real household consumption was 0.07 per cent. These results support the idea that the above Divisia index measures, because they incorporate negative share effects with no welfare significance, understate the true gains to economic activity and economic wellbeing from eliminating tariffs on items under reference.

Dixon and Rimmer confirm, however, that the disaggregated industry or commodity results are very similar in the comparative static and dynamic simulations.[7] Accordingly, the detailed industry results from the dynamic simulations are reported below. Because they match the comparative static results closely, they can be viewed with more confidence than the macroeconomic results.

Real investment and other macroeconomic aggregates

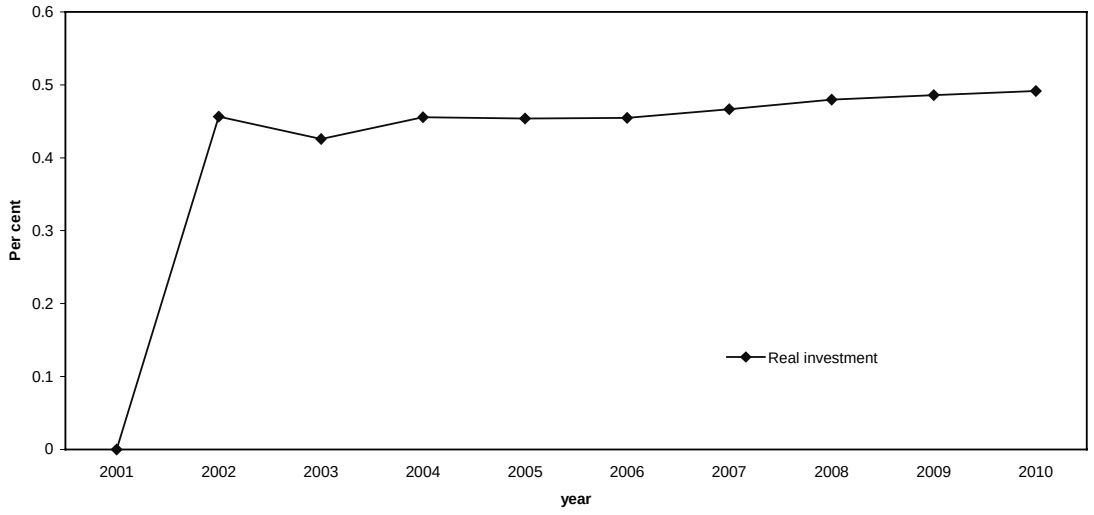
Figure 1.3 shows the estimated path of investment responsible for the induced growth in capital stocks. As expected, there is a noticeable increase in aggregate real investment, beginning in the period after the tariffs have been eliminated.

The investment responses are not the same in all industries. Removing tariffs on items under reference reduces the prices of capital goods, but it also reduces the prices of some non-capital inputs to production. In those industries (eg mining) not experiencing a direct cut in tariffs (and hence no direct pressure on their output prices), both effects serve to raise rates of return, and encourage investment. The induced increase in profits relative to the initial economy-wide wage also

[7] The reason they differ at all is because in the closure used for the dynamic simulations, some Divisia aggregates and the relativities between their components were held constant, whereas in the comparative static simulation, each component was held constant directly. Because of index number problems, the two approaches are not equivalent.

encourages substitution towards labour, so that employment in these industries starts to rise by even more than the capital stock.

Figure 1.3 **Response of real investment**
(percentage deviation from base case value)



Data source: PC estimates based on MONASH model dynamic simulation.

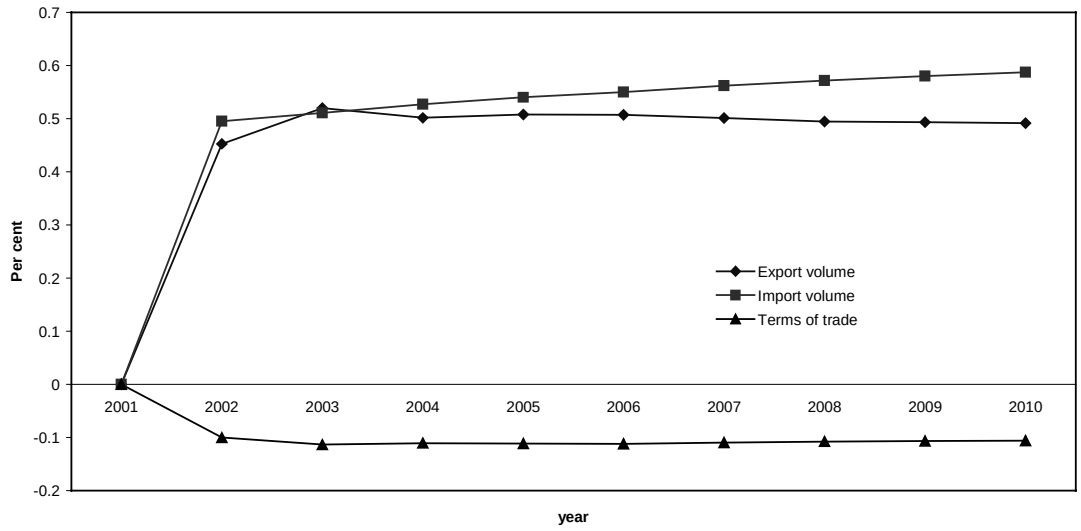
In industries facing the tariff cuts, the downward pressure on output prices usually outweighs the benefits of lower capital and other input prices. Rates of return fall and this discourages investment, often by enough to lead to a decline in capital stocks. In addition, the decline in profits relative to the initial economy-wide wage encourages substitution away from labour, so that employment in these industries starts to fall by more than the decline in capital stocks.

Because the industries protected by tariffs under reference are a relatively small part of the economy, the estimated positive effects of tariff removal on other industries dominate. Aggregate investment rises. In addition, the expansion in output in industries not directly affected by tariff cuts puts upward pressure on the economy-wide pre-tax wage relative to profits. This is sufficient to raise the estimated pre-tax wage relative to the consumer price index — the real pre-tax wage rises. By 2010, the pre-tax wage has also risen relative to profits in most industries, so that most industries are by then more capital-intensive than in the base case. Post-tax real wages nevertheless remain below their value in the base case because of the initial increase in income taxes on labour income used to make up the lost tariff revenue.[8]

[8] One referee at the modelling workshop asked whether the increase in the pre-tax real wage was consistent with Stolper-Samuelson effects. In an economy with fixed endowments of capital and labour, in which all industries face the same wage and the same rental price of capital, the

Figure 1.4 shows the estimated time paths of imports and exports, and resultant terms of trade. The removal of tariffs on items under reference reduces prices and production costs in Australia relative to overseas, thereby leading to a decline in the real exchange rate. While the tariff reductions encourage imports, the real depreciation encourages exports. Imports tend to rise more than exports, consistent with a current account deterioration and capital inflow associated with foreign financing of the higher capital stocks. The increase in export volumes is associated with a decline in the terms of trade.

Figure 1.4 **Response of aggregate exports, imports and terms of trade**
(percentage deviation from base case)



Data source: PC estimates based on MONASH model dynamic simulation.

Stopler-Samuelson theorem states that an expansion in labour-intensive industries would induce an increase in the wage relative to the rental price of capital. The MONASH results differ from Stolper-Samuelson effects, not only because the capital endowment is not fixed, but also because industries do not face the same rental price of capital except in the very long run. The results tend to exhibit Rybczynski effects, whereby an increase in the capital stock leads to an increase in the wage/rental ratio. Nevertheless, as the referee noted, the wage results could be affected by labour aggregation bias.

National effects — sensitivity analysis

Impact of productivity improvements

One of the assumptions made in the current analysis is that the removal of tariffs on items under reference can induce an increase in productivity in the affected industries. The magnitude of this effect was based on empirical work for Australia, but similar effects have been found in overseas studies (appendix C). As noted in the introduction, this assumption attracted comment at the modelling workshop. To assess the sensitivity of the results to this assumption, table 1.1 presents snapshot results, showing the cumulative deviation in macroeconomic aggregates in 2010 (nine years after implementation), both with and without these induced productivity improvements.

The results show that without the productivity improvement in affected industries, the estimated reduction in capital and material input costs is smaller than otherwise, as is the induced increase in investment and hence in capital stocks. With a smaller increase in investment and capital, the upward pressure on real wages is eased, so that the adverse affect of this increase on some export-oriented industries is moderated. As a result, export volumes can actually be higher than in the base case by more than they were when productivity improvements were assumed. However, the estimated terms of trade effects are also more adverse.

Table 1.1 **Estimated national effects of manufacturing productivity improvements induced by the removal of tariffs under reference**
(percentage deviations from base case values in 2010)

	Excluding productivity growth	*Including productivity growth*
Real GDP	0.02	0.08
Real household consumption	-0.06	0.04
Real investment	0.39	0.49
Export volumes	0.55	0.49
Import volumes	0.54	0.59
Terms of trade	-0.13	-0.11
Pre-tax real wage	0.55	0.60
Post-tax real wage	-0.22	-0.10

Source: PC estimates based on MONASH model dynamic simulations.

Overall, the estimated gain in real GDP is reduced to 0.02 per cent or $120 million. The small gain in real household consumption is converted to a small loss of 0.06 per cent, or $210 million. This is more than fully accounted for by the effects of the terms of trade decline. As noted above, this terms of trade decline is probably exaggerated, given the standard trade parameters used in the MONASH model. In addition, the estimated effects on GDP and household consumption would also be biased downwards because of share effects.

Concessional vs non-concessional tariffs

Around 30 per cent of all imports by value with general rates of 5 per cent enter under concessional arrangements (appendix B). Most of these concessional imports enter under TCO arrangements either duty free, or at a concessional rate of 3 per cent, so the impact of removing tariffs on these items on domestic activity levels is a relatively small, but positive, part of the total effect (table 1.2).

This gain is possibly exaggerated because it has been assumed that items typically entering under concessional arrangements are substitutes (albeit imperfect) for domestic supplies. Removal of the scheme would therefore not only reduce the cost of imported items, but also put downward pressure on the prices of domestic supplies. If instead there were no downward pressure on the prices of domestic supplies, there would still be gains from eliminating the tax on imported intermediate inputs and capital goods.

Table 1.2 **Estimated national effects of removing concessional and non-concessional tariffs under reference**[a]

(percentage deviations from base case values in 2010)

	Concessional rates to zero	*5 per cent general rates to zero*	*All tariffs under reference to zero*
Real GDP	0.01	0.07	0.08
Real household consumption	0.01	0.03	0.04
Real investment	0.10	0.39	0.49
Export volumes	0.04	0.45	0.49
Import volumes	0.10	0.49	0.59
Terms of trade	-0.01	-0.10	-0.11
Pre-tax real wage	0.11	0.49	0.60
Post-tax real wage	-0.01	-0.09	-0.10

a Components may not add to total because of interaction effects in removing concessional and non-concessional tariffs.

Source: PC estimates based on MONASH model dynamic simulations.

The real GDP gain from removing concessional tariffs is equivalent to about $60 million, while the gain in real household consumption is equivalent to about $35 million, both in current dollars.

An alternative way of making up the tariff revenue

When the lost tariff revenue is made up by cuts in government spending, the fall in demand for the relatively labour-intensive activities eases pressure on pre-tax real wages (table 1.3). This benefits investment activity, and could in principle benefit export activity, all other things being equal. However, with income tax rates no longer being raised, there is an increase rather than a decrease in the post-tax real wage. This directly simulates real household consumption expenditure. Together, the increases in investment and consumption spending crowd out exports, so that the terms of trade decline is less severe than when income tax rates were raised to make up the tariff revenue.

Overall, when government spending is cut in response to the lost tariff revenue, estimated real household consumption rises in the ninth period by 0.50 per cent. But the value of this to consumers needs to be discounted by the 0.95 per cent reduction in government spending on goods and services.

Table 1.3 **Estimated national effects of using alternative means of recovering tariff revenue**
(percentage deviations from base case values in 2010)

	Cutting government spending	*Raising labour income tax rates*
Real GDP	0.17	0.08
Real household consumption	0.50	0.04
Real government consumption	-0.95	0.00
Real investment	0.80	0.49
Export volumes	0.35	0.49
Import volumes	0.77	0.59
Terms of trade	-0.06	-0.11
Pre-tax real wage	0.53	0.60
Post-tax real wage	0.53	-0.10

Source: PC estimates based on MONASH model dynamic simulations.

1.4 Sectoral effects

Overview

Achieving the estimated higher real GDP and economic wellbeing requires resources to move away from the import-competing activities supported by tariffs under reference towards other (including new) activities. Industries likely to gain are those that benefit from cheaper capital and material inputs, but are not unduly affected by the induced increase in the real wage. These could include some manufacturing activities not directly covered by items under reference — those competing with imports attracting zero tariffs, and TCF and PMV items. It would also include many non-manufacturing activities.

Table 1.4 shows a snapshot of the estimated aggregate sectoral output and employment responses in 2010, nine years after the elimination of tariffs under reference. The cumulative effects in that year are larger than in any previous year. All subsequent sectoral and regional estimates are also shown in this form.

Table 1.4 **Comparison of sectoral activity and employment levels from mid-1980s to mid-1990s with estimated effects of the removal of tariffs on items under reference**

	Output		*Employment*	
	Estimated effect of tariff reductions	*Average annual growth from mid-1980s to mid-1990s*	*Estimated effect tariff reductions*	*Average annual growth from mid-1980s to mid-1990s*
	%	% per year	%	% per year
Agriculture, forestry, fishing and hunting	-0.04	0.54	-0.13	-0.83
Mining	0.61	5.26	0.35	-0.41
Manufacturing	-0.01	1.76	-0.52	-1.27
Services	0.15	3.60	0.07	2.60

a Output is measured as real industry gross product (ie value added). The estimated effects are deviations from base in 2010.

Source: PC estimates based on MONASH model dynamic simulation; ABS (*Australian National Accounts, National Income, Expenditure and Product*, Cat. no. 5204.0, Supplementary data).

Overall, the removal of tariffs on goods under reference is likely to lead eventually to a minimal reduction in the size of the manufacturing sector, relative to what it would otherwise be. This estimated reduction in sectoral output includes the moderating effects of productivity changes likely to be induced by tariff reductions.

Without such sectoral productivity improvements, the decline in manufacturing sector output would be slightly bigger, at –0.05 per cent.

There is also likely to be a very small reduction in the size of the agricultural sector, relative to what it would otherwise be. For this sector, the MONASH model indicates that the induced increase in the real wage outweighs the effects of cheaper capital and material inputs. Because broadacre agriculture is trade-exposed, and because its foreign demands are relatively price sensitive, it cannot pass the effects of higher wages through to prices to the same extent as other sectors.

By contrast, the mining sector, being very capital-intensive, is estimated to benefit more from cheaper capital and material inputs than it loses from higher wages. Mining is the main sector estimated to benefit from removal of duties on concessional entry imports, because it is a relatively intensive user of machinery inputs subject to those duties. The services sector also gains overall because, although it is labour-intensive, it can pass the effects of higher wages through into its prices more easily than can the trade-exposed sectors.

In all sectors, the outcomes for employment are also small, but less favourable than the outcomes for output. This is because the increase in the real wage is sufficient to induce an increase in the capital intensity of almost all industries by 2010. In the manufacturing sector, this effect is reinforced by the productivity improvements expected to occur in the individual industries affected by the tariff cuts.

With aggregate employment determined by general economic conditions, the estimated employment losses relative to the base case in manufacturing and agriculture are offset by increased employment in service and mining activities. The workers leaving manufacturing or agriculture are not necessarily the same as the additional workers engaged in service activities. This is because entries and exits from the labour force are occurring continually, as are changes in the employment status of individuals in the labour force, and these gross flows between employment states are typically much larger than the net flows in any given period. Table 1.4 also confirms that the net additional movements induced by removal of tariffs on items under reference would be small, relative to the average annual net movements that have occurred historically. The regional and labour market adjustment dimensions of this issue are discussed below.

In summary, eliminating tariffs on items under reference would eventually produce very small cumulative reductions in output and employment in manufacturing and agriculture, relative to what otherwise would be, with offsetting very small increases in output and employment in mining and services. At the broad sectoral level, the estimated cumulative movements would be equivalent to less than a year's historical change in output or employment.

Manufacturing output

The removal of tariffs on items under reference is estimated to have a mixed impact on individual manufacturing industries. Typically the impact, inclusive of the effects of higher productivity induced by tariff reductions, is likely to be less than one year's growth, based on average annual experience from the mid-1980s to the mid-1990s (table 1.5). For 7 of the 11 manufacturing industry subdivisions, the removal of tariffs under reference is estimated to lower output from levels that would otherwise prevail. The level of activity in the remaining four subdivisions (including TCF and transport equipment) is estimated to increase above levels that would otherwise prevail. The circumstances associated with the estimated increase differ between subdivisions.

Table 1.5 **Estimated output implications of removing tariffs under reference, by manufacturing industry subdivision**[a] (per cent)

Sector	*Concess-ional rates to zero*	*5 per cent general rates to zero*	*Total*	*Annual average - mid-1980s to mid-1990s*	*Annual equivalent of tariff change*
				% per year	yrs
Food, beverages and tobacco	-0.01	-0.03	-0.04	2.30	0.0
Textiles, clothing, footwear and leather	0.00	0.08	0.08	-2.11	0.0
Wood and paper products	0.01	-0.77	-0.76	0.30	2.5
Printing, publishing and recorded media	0.03	-0.18	-0.15	1.76	0.1
Petroleum, coal, chemical and associated products	-0.06	-0.24	-0.30	2.18	0.1
Non-metallic mineral products	0.06	-0.07	-0.01	0.45	0.0
Basic metal products	0.06	0.40	0.45	2.50	0.2
Fabricated metal products	-0.01	-0.21	-0.21	1.16	0.2
Transport equipment	0.00	0.15	0.14	0.79	0.2
Other machinery and equipment	0.06	0.51	0.57	2.25	0.3
Other manufacturing	0.01	-0.71	-0.69	0.57	1.2
Total manufacturing	**0.01**	**-0.03**	**-0.01**	**1.76**	**0.0**

[a] Output is measured as industry gross product or value added. Value added is defined as sales less the cost of goods and services used in production adjusted for changes in stocks. Components in first two columns may not add to total in third column because of interaction effects in removing concessional and non-concessional tariffs. The first three columns are deviations from base in 2010.

Source: PC estimates based on MONASH model dynamic simulation; ABS (*Australian National Accounts, National Income, Expenditure and Product*, Cat. no. 5204.0, data provided on request).

Output is estimated to increase in the TCF and Transport equipment subdivisions because of the joint impact of lower tariffs on capital and material inputs, but no tariff reductions on imported items competing with local output. In these circumstances, an increase in effective protection is afforded to these industries.

In modelling TCF and PMV industry responses to tariff reductions in other sectors, this analysis assumes that producers adjust to the increase in effective assistance by increasing investment and expanding output. In practice, TCF and PMV producers could anticipate their own future tariff reductions and not expand their activities. The model estimates are therefore likely to overstate the output effects of the removal of tariffs on items under reference.

Output is also estimated to be higher than otherwise for basic metal products and for other machinery and equipment. These industries benefit from the increase in investment activity, despite the reduction in their own tariffs.

Manufacturing employment

In all manufacturing subdivisions, other than transport equipment and other machinery and equipment, employment is estimated to be slightly lower than otherwise as a result of eliminating tariffs on items under reference (table 1.6). The estimated employment decline from levels that would otherwise prevail is typically less than one per cent. In relation to recent experience, estimated employment declines for 3 of the 11 manufacturing subdivisions represent more than one year's historical decline.

There are three main influences on the estimated employment changes. First, there is the direct effect of any output reductions arising from declining assistance. Second, in industries directly affected by the tariff cuts there are productivity improvements that generate resource savings per unit of output. Third, there is a substitution away from labour in response to higher real wages facilitated by lower tariffs.

With aggregate employment assumed fixed, the output effect more than offsets the substitution effect for most non-manufacturing industries. On the other hand, for manufacturing industries, the productivity and substitution effects either reinforce negative output effects (eg wood and paper products) or outweigh positive output effects (eg basic metals).

Table 1.6 **Estimated industry employment implications of removing tariffs under reference, by manufacturing industry subdivision** (per cent)

Sector	*Concess-ional rates to zero*	*5 per cent general rates to zero*	*Total*	*Annual average - mid 1980s to mid 1990s*	*Annual equivalent of tariff change*
				% per year	yrs
Food, beverages and tobacco	-0.04	-0.15	-0.19	-0.49	0.4
Textiles, clothing, footwear and leather	-0.01	-0.10	-0.11	-4.18	0.0
Wood and paper products	-0.07	-1.48	-1.55	-0.84	1.8
Printing, publishing and recorded media	-0.02	-0.53	-0.55	0.92	0.6
Petroleum, coal, chemical and associated products	-0.16	-0.52	-0.69	-0.86	0.8
Non-metallic mineral products	-0.04	-0.81	-0.85	-2.31	0.4
Basic metal products	-0.04	0.01	-0.05	-3.33	0.0
Fabricated metal products	-0.13	-1.16	-1.29	-0.24	5.4
Transport equipment	-0.02	0.09	0.07	-3.44	0.0
Other machinery and equipment	-0.08	0.14	0.06	-0.97	0.1
Other manufacturing	-0.03	-1.52	-1.55	1.33	1.2
Total manufacturing	**-0.07**	**-0.45**	**-0.52**	**-1.27**	**0.4**

a Actual employment growth is estimated by reference to changes in industry employment at 30 June. Components in first two columns may not add to total in third column because of interaction effects in removing concessional and non-concessional tariffs. The first three columns are deviations from base in 2010.

Source: PC estimates based on MONASH model dynamic simulation; ABS (*Manufacturing Industry, Australia*, Cat. no. 8221.0).

1.5 Regional effects

Output

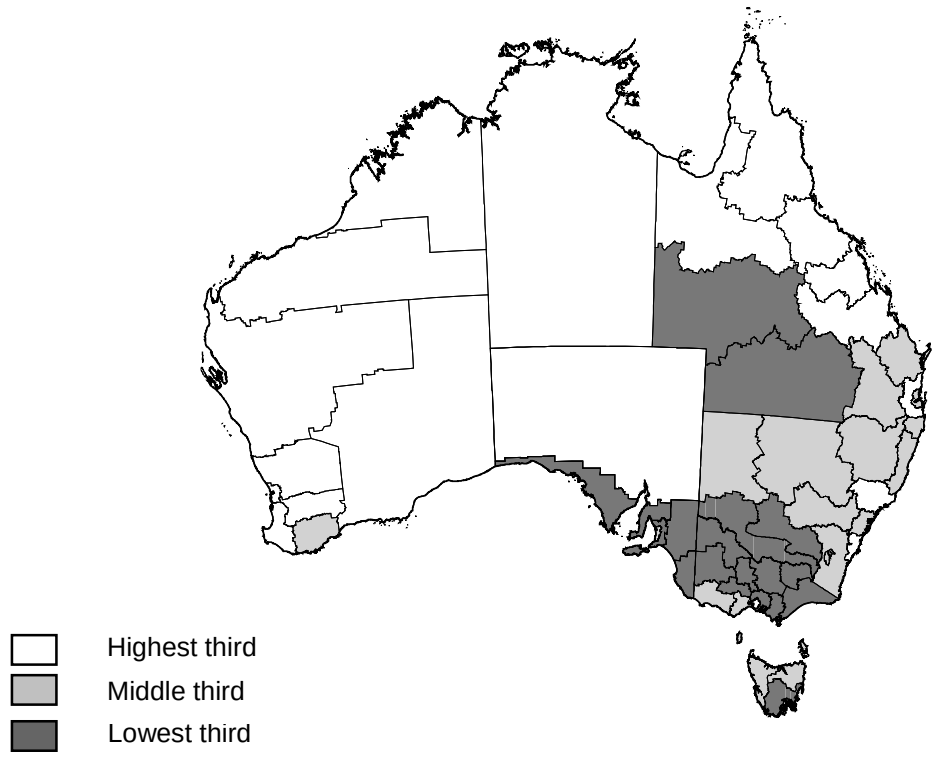
Output is projected to be slightly higher than otherwise in all States and nearly all sub-State regions.[9] Some regions are estimated to fare better than others, depending on the mix of industries in the region and how each industry is affected by tariff reductions. However, it is unlikely that the tops down methodology used can

[9] There are four exceptions — the South West statistical division in Queensland, and the Outer Adelaide, Yorke and Lower North, and South East statistical divisions in South Australia. The largest output decline is in this last region, at 0.11 per cent. For the other three regions, the output declines are negligible.

capture the full diversity of regional effects. The regions that are estimated to have the largest output gains are those specialising in activities benefiting most from tariff reductions — mining and services. These regions tend to be located in either inland Australia (mining and supporting services) or coastal areas (services and light industry). Even so, their output gain is typically less than 0.3 per cent.

Most capital city regions (except Perth) are estimated to have average to below average output growth, reflecting a slightly larger concentration in those areas of industrial activities supported by tariffs of 5 per cent or less (figure 1.5). Regions concentrating in broadacre agriculture and in high rainfall and water-intensive agricultural activities (such as fruit, vegetables, and forestry) are estimated to have the weakest output effects. The former are adversely affected by higher wages and the latter are affected by the negative flow-on effect of tariff reductions on downstream processing activities (such as fruit and vegetable processing and sawmill products).

Figure 1.5 **Estimated regional output effects of the removal of tariffs on items under reference**



a Output is estimated as gross regional product. Results are deviations from base in 2010.

Data source: PC estimates based on MONASH model dynamic simulation.

Employment

It is assumed that tariff reforms have no influence on aggregate employment. Rather, real wages and wage relativities are assumed to change to provide the signals for the relocation of available labour between activities. In this environment, therefore, labour market effects of tariff reductions are realised though changes in real wages rather than national employment. The long-run view lying behind this is that employment will have returned to a level consistent with the prevailing 'non-accelerating inflation rate of unemployment' (NAIRU) determined by labour market, social and training policies.

Assuming that the national level of employment is not affected by tariff reductions, slightly higher output from the reductions would require slightly higher productivity of labour. With no change in aggregate employment, there would be some small relocation of labour between regions to achieve that higher productivity.

After the relocations are taken into account, employment in 35 of the 57 regions is estimated to be slightly lower than otherwise in response to lower tariffs — even though value added is slightly higher in almost all of the regions. Conversely, employment is estimated to be slightly higher than otherwise in 22 regions. Tariff reductions are estimated to have a mixed effect on metropolitan regions. Employment in the Sydney, Melbourne, Brisbane, Adelaide and Greater Hobart divisions is estimated to be lower than otherwise, while employment in the remaining capital city divisions is expected to be higher. The main relocation of employment away from non-metropolitan divisions is estimated to occur in Victoria and South Australia.

Table 1.7 presents information on the magnitude of employment changes by region induced by the tariff change, categorised according to whether regional employment grew or declined from the mid-1980s to the mid-1990s. The table also shows, for each group, whether tariff reductions are estimated to raise or lower regional employment from levels that would otherwise prevail.

The estimated employment effects are small — relative to the base case, the largest increase is only 0.5 per cent (Goldfields-Esperance in Western Australia) and the largest estimated decrease is only 0.3 per cent (South East in South Australia):

Table 1.7 Actual regional employment growth and estimated employment changes due to the removal of tariffs under reference and annual equivalent of employment changes

			With actual empl. declines		With actual empl. increases	
	Actual	Tariff reductions	Tariff decline	Tariff increase	Tariff decline	Tariff increase
	% per year	%	yrs	yrs	yrs	yrs
New South Wales	1.39	0.00				0.00
Sydney	1.43	-0.01			0.01	
Hunter	1.46	0.08				0.05
Illawarra	1.67	0.03				0.02
Richmond-Tweed	3.60	0.00				0.00
Mid-North Coast	2.60	-0.02			0.01	
Northern	0.01	-0.01			0.54	
North Western	0.73	0.00			0.00	
Central West	0.77	-0.03			0.04	
South Eastern	1.96	0.02				0.01
Murrumbidgee	0.85	-0.05			0.06	
Murray	0.58	-0.06			0.11	
Far West	-1.60	0.11		0.07		
Victoria	0.65	-0.05			0.08	
Melbourne	0.91	-0.06			0.06	
Barwon	1.09	-0.01			0.01	
Western District	-0.32	0.00	0.01			
Central Highlands	0.99	-0.06			0.06	
Wimmera	-0.47	-0.03	0.07			
Mallee	0.23	-0.03			0.11	
Loddon	1.38	-0.04			0.03	
Goulburn	1.09	-0.03			0.03	
Ovens-Murray	1.63	-0.05			0.03	
East Gippsland	0.16	-0.06			0.38	
Gippsland	-0.55	-0.06	0.11			
Queensland	3.15	0.02				0.01
Brisbane	3.03	-0.01			0.00	
Moreton	6.11	0.04				0.01
Wide Bay-Burnett	2.74	-0.05			0.02	
Darling Downs	1.42	-0.03			0.02	
South West	-0.20	-0.12	0.57			
Fitzroy	1.58	0.11				0.07
Central West	-0.47	-0.06	0.13			
Mackay	2.69	0.13				0.05
Northern	1.86	0.06				0.03
Far North	4.78	0.06				0.01
North West	0.94	0.34				0.36
South Australia	0.68	-0.07			0.10	
Adelaide	0.53	-0.06			0.10	
Outer Adelaide	2.20	-0.11			0.05	
Yorke and Lower North	-0.76	-0.08	0.11			
Murray Lands	0.31	-0.05			0.15	
South East	0.15	-0.31			2.12	
Eyre	-0.89	-0.03	0.03			
Northern	-1.17	-0.04	0.03			
Western Australia	2.19	0.10				0.05
Perth	2.63	0.09				0.03
Peel	6.09	0.04				0.01
South West	3.21	0.08				0.02
Great Southern	1.53	-0.01			0.01	
Wheatbelt	0.55	0.04				0.07
Goldfields-Esperance	3.29	0.47				0.14
Mid West	1.84	0.24				0.13
Gascoyne	-2.24	0.13		0.06		
Pilbara	-0.62	0.24		0.40		
Kimberley	3.66	0.14				0.04
Tasmania	0.72	-0.03			0.05	
Greater Hobart	0.70	-0.01			0.01	
Southern	1.13	-0.10			0.09	
Northern	0.66	-0.05			0.08	
Mersey-Lyell	-0.48	-0.04	0.09			
Northern Territory	2.00	0.13				0.01
Aust.Cap.Territory	1.28	0.02				0.10

Sources: PC estimates based on MONASH dynamic simulation; ABS (*Population Census*, Cat. no. 2015.0).

- in the 45 regions where employment grew over the decade to the mid-1990s, there would be :
  - more jobs than otherwise in 19 regions; and
  - fewer jobs than otherwise in 26:
    - in all but one of which the estimated loss of jobs would be equivalent to less than one year of the recent growth in jobs; and
    - for that one region (South East in South Australia), it would be equivalent to about two years of the relatively slow growth that occurred in it;
- in the 12 regions that lost jobs over the decade to the mid-1990s, there would be:
  - more jobs than otherwise in 3 regions;
  - fewer jobs than otherwise in 9 regions; and
    - in each, the estimated loss of jobs would be equivalent to less than one year of recent job losses.

1.6 Implications of tariff reductions for labour market adjustment

Any change in assistance will induce some adjustment, economic restructuring and the relocation of jobs. However, assistance-induced adjustment does not occur in isolation from other economic changes and therefore needs to be assessed against the general level of structural adjustment taking place in product and labour markets. In a general setting, tariff reductions that simply reduce the underlying rate of employment growth in an industry are likely to impose lower labour market costs on employees than reductions that convert employment growth to an employment decline.

There may be some additional labour market adjustment costs associated with reducing assistance — such as job search, retraining of displaced workers and interstate migration. In principle, however, tariff-induced changes could also reduce total labour market adjustment costs by ameliorating the effects of other ongoing structural adjustments. To the extent that the net effects of these costs and benefits are not taken into account within MONASH, the gains from reducing assistance would be over (or under)-stated.

This section uses a labour input loss index (LILI) to provide information about the likely impact of tariff reductions on ongoing labour market adjustment costs. The index is used to impute a labour market adjustment cost to each year of the dynamic base case, and to each year of the dynamic policy simulation. The adjustment costs

associated with removing tariffs under reference are calculated as the difference between the two.

Box 1.2 outlines the scope of the adjustment cost calculations and key assumptions lying behind them. A detailed outline of the LILI is provided in appendix D.

While the LILI provides a measure of labour market adjustment, it does not measure costs to the economy as a whole from the adjustment of capital. A key example would be the premature scrapping of capital in the face of a change that was not anticipated. To the extent that tariff reductions are anticipated, then investment plans can be adjusted so that these costs are reduced. Capital adjustment costs are also less important when the capital has alternative uses (or users).

Box 1.2 Scope and key assumptions of the labour input loss index (LILI)

The LILI measures the person years lost because of labour market adjustment. It quantifies the annual costs of all gross changes in labour market states in the study reference year and in subsequent years. For the purpose of this study, the reference year is defined to be the year preceding the removal of tariffs under reference.

Information about the impact of economic growth and structural change on net labour market adjustment is drawn from MONASH model simulation results. This is converted to estimates of gross labour market movements using information and assumptions about labour mobility. Costing each gross labour market movement according to the likely impact on the amount of time withdrawn from employment provides an overall measure of labour market adjustment costs, measured in person-years. Labour market adjustment costs so derived can be converted to a dollar values using current estimates of average annual earnings per person employed derived from the Australian National Accounts (ABS Cat. no. 5204.0).

The index covers:

- the estimated cost of moving between employed, unemployed or not in the labour force states (assumed to be 3 to 9 months depending on the change);
- the cost of remaining in unemployment (one year per person unemployed);
- the cost of moving voluntarily between jobs in the same occupation and State (assumed to be zero for each move); and
- the cost of moving between occupational group or State-based region (assumed to be 3 person months for each move).

Labour market adjustment costs not quantified in the current analysis include: the cost of moving between jobs in a given occupation within a sub-State region (ie statistical division) and costs incurred while remaining in the same job.

Source: Dixon, Parmenter and Rimmer (1997); appendix D.

The LILI also does not include adjustment costs that affect individuals, but are not costs to the economy as a whole. A key example would be the stamp duty paid on house purchase when people change location. This is a transfer to the government rather than a cost to the economy as a whole.[10]

The estimated impact on ongoing labour market adjustment of removing all tariffs under reference is *relatively* small. Overall, it is estimated that the ongoing labour market adjustment costs of structural unemployment would amount to 683 000 person-years per year (table 1.8). The ongoing movement of people between occupations and regions (employment categories), labour force growth, and transitional unemployment would contribute a further 87 000 person years lost, for a total ongoing labour market adjustment cost of 770 000 person-years per year. By contrast, it is estimated that the removal of all tariffs under reference would add only about 3000 person-years to labour market adjustment costs in the first full year of implementation.

Table 1.8 **Estimated labour market adjustment costs and impact of the removal of all tariffs under reference, first full year of implementation**[a]

Component of adjustment	*Person years*	*Dollar value (1998-99 prices)* [b]
	thousand	$million
With initial labour force (structural unemployment**)**	683.0	19 884
Incremental change in year of tariff reduction (reference case**)**		
Movement between employment categories	41.8	1 217
Ongoing labour force growth	39.5	1 149
Transitional unemployment	5.9	173
Sub total	87.2	2 539
Impact of tariff reductions (policy simulation**)**	3.1	91
Total	**773.3**	**22 514**

a The labour market adjustment model used in this analysis indexes labour market changes to mid-year value. The first full-year effect of tariff reductions on labour market adjustment costs is therefore recorded in the second period after implementation. Adjustment costs for that year are reported. **b** The LILI model reports all estimates of labour market adjustment costs as a proportion of the labour force (appendix D). To convert these estimates to person years and 1998-99 equivalent values, the average number of persons in the labour force in 1998-99 (9.4 million) was adopted as the labour force reference value. It was assumed that average adjustment cost per person year was $29000, based on average weekly earnings.

Source: PC estimates based on MONASH dynamic simulations and LILI model; ABS (*Labour Force*, Cat. no. 6202.0); ABS (*Average Weekly Earnings*, Cat. no. 6301.0).

10 To the extent that stamp duty on house purchase discourages locational changes that would be worthwhile otherwise, it can lead to an inefficient location of resources and impose an indirect efficiency cost on the economy as a whole. But this cost is imposed by a lack of adjustment, rather than by adjustment per se.

In 1998-99 values, the largest additional labour market adjustment costs in any one year are estimated to be about $90 million (table 1.8). They decline thereafter, and by 2010 have fallen to about $70 million, again using current 1998-99 values. This total compares with the estimated increase in GDP of around $480 million and in economic wellbeing of $140 million in current dollars in 2010 (the ninth year after implementation). According to these estimates, the small additional labour market costs incurred are outweighed by small increases in output and economic wellbeing.

In responding to the draft report, a number of participants criticised the use of average weekly earnings in converting adjustment costs in person-years to dollar values. They considered that the average weekly earnings in manufacturing of around $36 000, or a higher wage cost, would be more appropriate (AIG sub. D122, PACIA sub. D123, Penrice Pty Ltd sub. D129, SA Government sub. D150). However, the adjustment is not confined to the manufacturing sector. The LILI calculations do not keep explicit track of the industries in which adjustment costs occur, but do keep track of the occupations involved, at a considerable level of detail. The detailed occupational results show that:

- removing all tariffs under reference induces additional voluntary movements out of occupations, but these are spread remarkably evenly across all occupations; and
- removing all tariffs under reference can either increase or decrease the number of involuntary movements out of occupations, both within manufacturing and elsewhere, eg there are fewer involuntary movements for geologists and geophysicists, but more for electrical and electronic engineers; there are fewer involuntary movements for metal casting tradespersons and vehicle body makers, but more for chemical, petroleum, gas and power generation plant operators; there are fewer involuntary movements for railway labourers, but more for food trades assistants.

With this spread of adjustment both within manufacturing and elsewhere, it was judged that an economy-wide average weekly earnings figure was more appropriate than one specific to an individual industry or occupation. Nevertheless, even using the average weekly earnings in manufacturing, the estimates indicate that the ongoing net benefits exceed the initial peak labour adjustment costs.

The labour market adjustment costs associated with removing just the concessional tariffs are smaller than for all items under reference. Removing concessional tariffs would add about 500 person-years to labour market adjustment costs in the first full year of implementation. In 1998-99 values, this is equivalent to about $14 million.[11] This total compares with the estimated increase in GDP of around

[11] The underlying base case adjustment costs would be the same as in table 1.8.

$60 million and in economic wellbeing of $35 million in current dollars in 2010 (the ninth year after implementation) from eliminating concessional tariffs. The additional labour market costs would be outweighed by these increases in output and economic wellbeing, even if labour market adjustment were costed using the average weekly earnings in manufacturing.

1.7 Summing up

Estimated effects of tariff reductions from modelling are no more than indicative. As noted in the introduction, when modelling the effects of policy changes as small as this, the 'signal to noise' ratio is relatively low.

Nonetheless, the results suggest that there could be small net benefits to Australia as a whole from removing tariffs on items under reference. Output is estimated to be higher, as is economic wellbeing. To achieve this, there is likely to be some relocation of productive resources between activities and regions. Based on recent experience, this relocation of resources, and labour in particular, is estimated to be small relative to ongoing labour market adjustment costs, and smaller than the estimated gains in activity levels and economic wellbeing. The same results apply if only concessional tariffs are removed.

A Industry classifications in the MONASH model

A.1 Introduction

Three levels of industry classification are adopted for the analysis of effects of changes in Australia's general tariff arrangements. At the highest level, industries are divided into four summary sectors. This distinction enables a broad overview of the effects of change on industry structure to be provided. At the second level of classification, the manufacturing industry is divided into 11 industry subdivisions to indicate the general impact of tariff and other changes on manufacturing — the main activities to be directly affected by any changes in the structure and level of the tariff.

These divisions are generally too broad for modelling and detailed analysis of the effects of changing tariffs. Accordingly, the detailed modelling work is undertaken using the standard MONASH 113 industries and 115 industry-of-origin commodities. The 113-group industry classification is based on the industry classification adopted in the 1989-90 input-output tables (ABS Cat. no. 5209.0) which in turn was based on the Australian Standard Industrial Classification (ASIC).

The ASIC was superseded in 1993 by the introduction of the Australian and New Zealand Standard Industrial Classification (ANZSIC) (ABS 1993). The ANZSIC involved some restructuring of the ASIC at the industry division level and substantial restructuring within the manufacturing division. In this study, each industry in the original MONASH ASIC-based industry classification has been linked to an ANZSIC industry. The 113 ANZSIC-based industry classification is the third and most detailed level industry classification adopted for this study.

The following sections set out the ANZSIC-based classifications adopted for this study and the working correspondence between those classifications and standard MONASH industry classifications.

A.2 Industry sector

To provide a broad indication of the effects of tariff and other economic changes, economic activity is divided into four industry sectors: agriculture, forestry, fishing and hunting; mining; manufacturing; and services. These ANZSIC-based sectors and the links of each sector to ANZSIC divisions and MONASH industries are shown in table A.1.

Table A.1 **Level 1 ANZSIC-based industry sectoring in MONASH**

	Sector	*ANZSIC divisions*	*MONASH industry code*
1	Agriculture, forestry and fishing	A	1 to 11
2	Mining	B	12 to 17
3	Manufacturing	C	18 to 84
4	Services	D to Q	85 to 113

Sources: ABS (*Australian and New Zealand Industry Classification* (*ANZSIC) 1993*, Cat. no. 1292.0); MONASH model data base.

A.3 Manufacturing subdivisions

The ANZSIC-based manufacturing industry subdivision classification used in this study has 11 industry categories. It modifies the ABS manufacturing 2-digit industry subdivision classification of 9 categories by retaining some details from the ASIC subdivisional classification for activities that have attracted higher than average levels of government support through border assistance and other measures. In particular, separate subdivisions for textiles, clothing, footwear and leather goods (a 2-digit subdivision in ANZSIC), and transport equipment (two 3-digit groups in ANZSIC) are included in the classification used in this study (table A.2).

However, the establishment of the ANZSIC-based subdivision classification has involved some rearrangement of traditional ASIC-based MONASH industries. For the ANZSIC industry textiles, clothing, footwear and leather goods, this has involved the rearrangement of some ASIC data from the previous ASIC subdivisions textiles and clothing and footwear and the ASIC group leather and leather products (table A.3). For the transport equipment industry, it has involved dividing the ANZSIC subdivision machinery and equipment (code 28) into two components — transport equipment (ANZSIC codes 281–2) and other machinery and equipment (ANZSIC codes 283–6). The ANZSIC-based classification adopted in this study includes other machinery and equipment in a separate category.

In addition, separate details are shown for basic metal products (ANZIC codes 271,2,3) and fabricated metal products (ANZSIC codes 274,5,6) because of the export orientation of the former activities.

The correspondence between the ANZSIC-based classification adopted in this study, the ASIC classification and traditional MONASH industries are shown in table A.3. The correspondence focuses on differences between the ANZSIC and ASIC-based classifications evident at the 3-digit or industry group level of the respective classifications.

A.4 ANZSIC-based industries

Industry categories at the most detailed level — level 3 — correspond to the categories in the standard MONASH model database. To establish an ANZSIC-based industry classification for analysis using the MONASH model, each MONASH category has been linked to an ANZSIC-based category in the ABS's input-output (IO) tables and thereby to ANZSIC industry classes. Details of the ANZSIC-based industry classification are provided in table A.4. A one-to-one concordance has been established between ANZIC and MONASH industry classifications. However, because the link between the underlying theoretical classifications (ie the ASIC and the ANZSIC) is not always one to one, some activities included in one ANZSIC-based industry would be classified to another industry if full information about the activity mix of industries were available. Such activities would be a 'surplus' to the industry(s) in which they are included and a 'deficit' in the industry to which it would be ideally included. Industries affected by deficits or surpluses are identified in table A.3.

The MONASH model also employs an industry of origin commodity classification. For all industries other than agriculture, there is a one-to-one correspondence between an industry and its counterpart industry of origin commodity. For agriculture, a product-based commodity classification has been applied in MONASH to complement the multi-product agricultural zonal industries. Table A.4 shows the concordance between ANZIC-based agricultural commodities and standard MONASH commodities.

Table A.2 **Manufacturing ANZSIC-based subdivision industry sectoring in MONASH and correspondence between ANZSIC and ASIC-based classifications**

ANZSIC-based classification	*Main corresponding ASIC industry(s)*	*MONASH industry codes*
21 Food beverages and tobacco	21 Food beverages and tobacco	18 to 29
22 Textiles, clothing, footwear and leather	23 Textiles	30 to 38
	24 Clothing and footwear	39
	plus ASIC group	
	345Leather and leather products	79
23 Wood and paper products	Wood, wood products and furniture	40 to 43
	plus ASIC group	
	263 Paper and paper products	44 to 46
24 Printing, publishing and recorded media	26 Paper, paper products, printing and publishing	47 to 48
	less ASIC group	
	263Paper and paper products	
25 Petroleum, coal, chemicals and associated products	27 Petroleum, coal, chemicals and associated products	49 to 56
	plus ASIC groups	
	346Rubber products	80
	347Plastic and related products	81
26 Non-metallic mineral products	28 Non-metallic mineral products	57 to 62
27 Basic metal products	29 Basic metal products	63 to 64
274,5,6Fabricated metal products	31 Fabricated metal products	65 to 67
281,2 Transport equipment	32 Transport equipment	68 to 71
283,6 Other machinery and equipment	33 Other machinery and equipment	72 to 78
29 Other manufacturing	Other manufacturing	82 to 83
	less 345 Leather and leather products	
	346 Rubber products	
	347 Plastic and related products	

Sources: ABS (*Australian and New Zealand Industry Classification* (*ANZSIC) 1993*, Cat. no. 1292.0); MONASH model data base.

Table A.3 **Level 3 ANZSIC-based industry classification in MONASH and correspondence to ANZSIC-based input-output and ASIC-based MONASH industries**

No	*ANZSIC-based industry*	*IO Code*	*Component ANZSIC code (1993)*	*Surplus/ deficit*[a]	*Code*	*MONASH short title (1993-94 data base)*
1	Pastoral zone				I1	Pastoral
2	Wheat-sheep zone	0101 to	0121 to		I2	WheatSheep
3	High rainfall zone	0103	0125		I3	HighRain
4	Northern beef				I4	NthBeef
5	Dairy cattle and pig farming	0104	0130		I5	MilkCattle
		0105	0151			
6	Poultry	0106	0141,2		I8	Poultry
		0107				
7	Other agriculture - incl. sugar cane, fruit and nuts		0113-9; 0161		I6	OthExport
8	Other agriculture - incl. vegetables, cotton, fodder and tobacco		0111,2; 0151-3,9; 0162,9		I7	ImportComp
9	Services to agric.; hunting	0200	0211-3,9; 0220	D	I9	AgServ
10	Forestry and logging	0300	0301-3	D	I10	Forestry
11	Commercial fishing	0400	0411-5,9; 0420	S	I11	Fishing
		1100				
12	Black coal		1101		I14	BlkCoal
13	Oil and gas; brown coal		1102, 1200		I15	OilGas
14	Iron ores	1301	1311		I12	IronOre
15	Non-ferrous metal ores	1302	1312-7,9		I13	Nferrous
16	Other mining	1400	1411,9, 1420		I16	OthMin
17	Services to mining	1500	1511-4, 1520		I17	MinServ
18	Meat and meat products	2101	2111-3	S	I18	Meat
19	Dairy products	2102	2121,2,9		I19	Dairy
20	Fruit and vegetable products	2103	2130		I20	FrtVeg
21	Oils and fats	2104	2140		I21	OilFat
22	Flour and cereal foods	2105	2151,2		I22	Flour
23	Bakery products	2106	2161-3		I23	Bakery
24	Confectionery	2107	2172		I24	Confect
25	Other food products	2108	2171,3,4,9	D	I25	Sea_Sugar
26	Soft drinks, cordials, syrups	2109	2181		I26	SoftDr
27	Beer and malt	2110	2182		I27	Beer
28	Wine and spirits	2111	2183,4		I28	OthDrink
29	Tobacco products	2112	2190		I29	Tobacco

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Table A.3 (continued)

No	*ANZSIC-based industry*	*IO Code*	*Component ANZSIC code (1993)*	*Surplus/ deficit*[a]	*Code*	*MONASH short title (1993-94 data base)*
		2201				
30	Wool scouring		2211	D,S	I30	Scouring
31	Synthetic fibre textiles		2212		I31	Synthetic
32	Cotton textiles		2213	S	I32	CottonYa
33	Wool textiles		2214		I33	WoolYarn
34	Textile finishing		2215		I34	TextileF
		2202				
35	Made-up textile products		2221,3,9	D	I36	Canvas
36	Textile floor coverings		2222		I35	Carpets
37	Knitting mill products	2203	2231,2,9	D	I37	Knitting
38	Clothing	2204	2241-3,9	D,S	I38	Clothing
39	Footwear	2205	2250	D	I39	Footwear
40	Leather and leather products	2206	2261,2	D,S	I79	Leather
41	Sawmill products	2301	2311-3	S	I40	Sawmill
		2302				
42	Plywood and veneers		2321	D	I41	Panels
43	Fabricated wood products		2322,3,9	S	I42	Fittings
		2303				
44	Pulp, paper and paperboard		2331		I44	PulpPaper
45	Paper and paperboard containers		2332,3,4	S	I45	BagsBoxes
46	Paper products nec	2304	2339		I46	Sanitary
47	Printing, services to printing	2401	2411-3		I48	CommPrint
48	Publishing recorded media etc	2402	2421-3, 2430	D	I47	NewsBooks
49	Petroleum and coal products	2501	2510, 2520		I56	Petrol
		2502				
50	Fertilizers		2531	D	I49	Fertilisr
51	Industrial, organic and inorganic chemicals		2532-5	D,S	I50	BasicChem
52	Paints	2503	2542		I51	Paints
53	Pharmaceuticals etc	2504	2543,4		I52	Pharmacy
54	Soap and detergents	2505	2545	S	I53	Soaps
55	Cosmetics and toiletries	2506	2546	D	I54	Cosmetics
56	Other chemical products	2507	2541,7,9	D,S	I55	Explosive
57	Rubber products	2508	2551,9	S	I80	Rubber
58	Plastic products	2509	2561-6	S	I81	Plastic
59	Glass and glass products	2601	2610	D	I57	Glass
60	Ceramic products	2602	2621-3,9		I58	ClayProd
		2603				
61	Cement and lime products		2631		I59	Cement
62	Concrete slurry		2633		I60	Readymix

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Table A.3 (continued)

No	*ANZSIC-based industry*	*IO Code*	*Component ANZSIC code (1993)*	*Surplus/ deficit*[a]	*Code*	*MONASH short title (1993-94 data base)*
63	Plaster; other concrete products	2604	2632,4,5	D	I62	Plaster
64	Non-metallic min. products nec	2605	2640	D,S	I61	Pipes
65	Iron and steel	2701	2711-3	S	I63	IronSteel
66	Basic non-ferrous metals etc	2702	2721-3,9 2731-3	S	I64	Nferrous
67	Structural metal products	2703	2741,2,9	S	I65	Structurl
68	Sheet metal products	2704	2751,9	S	I66	SheetMetl
69	Fabricated metal products	2705	2761-5,9	D	I67	Wire
70	Motor vehicles and parts etc	2801	2811-3,9, 2829	D	I68	MotorVeh
71	Ships and boats	2802	2821,2		I69	Ships
72	Railway equipment	2803	2823		I70	Trains
73	Aircraft	2804	2824		I71	Aircraft
74	Scientific etc equipment	2805	2831,2,9	D,S	I72	SciEquip
75	Electronic equipment	2806	2841,2,9	D,S	I73	Electron
76	Household appliances	2807	2851	S	I74	HousAppl
		2808				
77	Cables and electrical equipment nec		2852,3,9	S	I75	ElectEq
82	Electric lights and signs		2854	S	I82	Signs
		2809				
78	Agricultural macinery		2861	D	I76	AgMach
79	Mining and construction machinery		2862,5	D	I77	ConMach
80	Other machinery and equipment	2810	2863,4,6,7,9	S	I78	ManuMach
81	Prefabricated buildings, furniture	2901	2911,9	D	I43	Furniture
		2902	2921-3,9	D,S		
83	Other manufacturing	2903	2941,2,9	D,S	I83	SportEq
84	Electricity	3601	3610		I84	Electrcty
85	Gas	3602	3620		I85	Gas
86	Water, sewerage and drainage	3701	3701,2		I86	Water
87	Residential building	4101	4111,2, 4210-59(p)		I87	Resident
88	Other construction	4102	4113, 4121,2, 4210-59 (p)		I88	OthBuild
89	Wholesale trade	4501	4511-4799(p)	D,S	I89	Wholesale
90	Retail trade	5101	5110-5329(p)	D	I90	RetailTrd
91	Mechanical repairs	5401	4611(p); 5311(p); 5321(p); 5322,3,9		I91	MechRep

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Table A.3 (continued)

No	*ANZSIC-based industry*	*IO Code*	*Component ANZSIC code (1993)*	*Surplus/ deficit*[a]	*Code*	*MONASH short title (1993-94 data base)*
92	Other repairs	5402	4511-4799(p); 5261, 9; 5110-5329(p)	D	I92	OthRepair
93	Accommodation, cafes & restaurants	5701	5710-40		I111	Hotels
94	Road transport	6101	6110,6121-3	D	I93	RoadTrans
95	Rail, pipeline, other transport	6201	6200, 6501,9		I94	RailTrans
96	Water transport	6301	6301-3		I95	WaterTran
97	Air and space transport	6401	6401-3		I96	AirTransp
98	Services to transport; storage	6601	6611,9; 6621-3,9; 6630; 6640-4,9; 6701,9	D,S	I97	TransServ
99	Communication services	7101	7111,2; 7120	D	I98	Communic
100	Banking	7301	7310,21		I99	Banking
101	Non-bank finance	7302	7322-4,9,30		I100	NonBank
		7303	7340	D		
102	Insurance	7401	7411,2; 7421,2	S	I102	Insurnce
103	Services to finance etc	7501	7511,9, 7520	D,S	I101	Investm
104	Ownership of dwellings	7701	ne		I104	Dwelling
105	Other property, business and legal services	7702	7712,20,30; 7741-3	D,S	I103	OthFinan
		7801	7810; 7821-3,9; 7831-4	D,S		
		7802	7841,2; 7851-5	D,S		
		7803	7861-7,9	D,S		
106	Government administration	8101	8111-3; 8120,30		I105	PubAdmin
107	Defence	8201	8200		I106	Defence
108	Education	8401	8410; 8421-4; 8431,2; 8440	S	I108	Educate
109	Health services	8601	8611-3; 8621-3; 8631-6,9; 8640	D	I107	Health

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Table A.3 (continued)

No	*ANZSIC-based industry*	*IO Code*	*Component ANZSIC code (1993)*	*Surplus/ deficit*[a]	*Code*	*MONASH short title (1993-94 data base)*
110	Community, religious and cultural services	8701	8710, 8721,2,9	D,S	I109	Welfare
		9101	9111-3, 9121,2	S		
		9201	9210; 9220; 9231,9; 9241,2; 9251,2,9	D,S		
		9601	9610; 9621,2,9; 9631-4	S		
111	Sport, gambling etc	9301	93112,9; 9321,2,9; 9330	D,S	I110	Entrtain
112	Personal services	9501	9511,9; 9521-6,9; 9700	D,S	I112	PerServ
113	Non-competing imports	ne	ne		I113	Other

a Where an ANZSIC based MONASH item includes activities that would be attributed to other industries if full information were available, the activity is referred to as a SURPLUS (S). This inclusion results in a DEFICIT (D) in ANZSIC industries in which the activity would be ideally included. The main cases for which industry definitions are affected by surpluses and deficits are identified in this table. For detailed information on links between the theoretical ANZSIC and ASIC classifications, see ABS (1993). For detailed information on the links between ASIC-based input-output industries upon which the MONASH industries are based and the ASIC, see Table A.3 and ABS (1994).

Sources: MONASH model data base; ABS (*Australian National Accounts, Input-output Tables 1994-95*, Cat. no. 5209.0 and supplementary data); ABS (*Australian and New Zealand Industry Classification* (*ANZSIC) 1993,* Cat. no. 1292.0).

Table A.4 **ANZIC-based commodity classification for agriculture and correspondence to MONASH commodities**

No	*ANZIC-based commodity*	*Code*	*MONASH short title (1993-94 data base)*
1	Wool	C1	Wool
2	Sheep	C2	Sheep
3	Wheat	C3	Wheat
4	Barley	C4	Barley
5	Other grains	C5	OthCereals
6	Meat cattle	C6	Meat
7	Milk cattle and pigs	C7	MilkCattle
8	Other agriculture – incl. sugar cane, fruit and nuts	C8	OthExport
9	Other agriculture – incl. vegetables, cotton, fodder and tobacco	C9	ImportComp
10	Poultry	C10	Poultry
11	Services to agriculture; hunting	C11	AgServ

Source: MONASH model database.

B Australia's general tariff arrangements

B.1 Introduction

This appendix examines the extent of tariff items subject to a general rate of duty of 5 per cent or less (excluding items covered by the TCF and PMV sectoral plans), and how tariff reductions would affect import prices.[1] In estimating the effect of tariff reductions on import prices, the analysis takes into account:

- the effects of tariff concessions;
- rating of tariffs by ad valorem (the general case) and unit value (specific rate items) procedures;
- retention of excise duty in tariff rates applying to excisable commodities; and
- developing and other country preferences.

The likely national, industry and regional effects of removing tariffs of 5 per cent or less are examined in chapter 1.

B.2 Distribution of tariff items subject to import duty

Recent trends

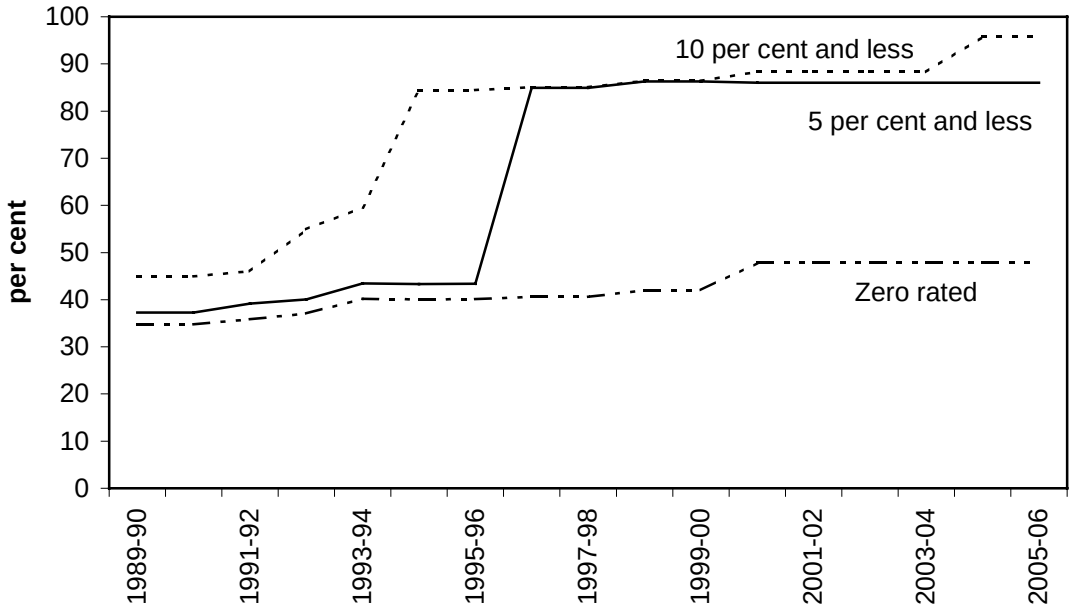
The tariff environment in which this review is occurring has evolved over nearly three decades. This environment is characterised by a series of tariff reductions commencing with the 25 per cent across the board tariff cuts of 1973.

Since 1988, there has been a substantial increase in the proportion of tariff items with a rate of 5 per cent or less (figure B.1). This increase can be attributed to the

[1] A tariff item is defined as an 8-digit import item as outlined in the Australian Customs Tariff Schedule.

effects of a series of tariff policy changes effecting progressively lower general tariff rates.[2]

Figure B.1 **Proportion of tariff line items with general rates of 5 per cent or less compared with the proportion attracting other rates, 1989-90 to 2005-06[ab]** (per cent)



a Rates for the years 1989-90 to 1995-96 and 1998-99 are averages for the year. From 1996-97 to 2003-04 and 2005-06, excluding 1998-99, the rates are for 1July, while for 2004-05 the rates are for 1 January 2005. The rates at 1 July 2000 are assumed to also apply for the periods 2001-02 to 2003-04. The distribution takes no account of this current review of general tariffs. **b** Tariff rates exclude the excise component of general rates on excisable goods.

Source: Commission estimates based on the Australian Customs Tariff.

In 1988, a four year phased tariff reduction program was announced in the Government's May Economic Statement. The program principally involved the phasing of tariff rates above 15 per cent down to 15 per cent and the phasing of tariffs between 10 and 15 per cent down to 10 per cent. Because the target tariff rates covered by the reductions were 10 per cent and above, the program did not substantially increase the proportion of items with a general rate of 5 per cent or less.

In 1991, a further tariff reduction program was announced in the Government's Building a Competitive Australia Statement. The program continued the phasing of general tariff rates from the 10 and 15 percent levels in 1992 to a general rate of

[2] Some of the minor variation in zero-rated items and 5 per cent and less items, in particular, is largely explained by changes in the total number of 8-digit tariff items.

5 per cent by July 1996. By 1 July 1996, around 85 per cent or more than 5000 tariff line items had a general rate of 5 per cent or less. No across-the-board changes to tariff rates at the 5 per cent level and below have been made or announced since 1996. There have been more limited reductions in tariff rates to zero as a result of the WTO Agreement on Information Technology from the Uruguay Round, domestic reviews of medical and scientific equipment and packaging and labelling, and the recent review of nuisance tariffs.

Typically, the general tariff reviews included reductions in border assistance to TCF and PMV activities, but allowed their general tariff rates to remain well above levels prevailing for other items. For example, the Government's 1991 Statement announced the phasing of tariffs in the PMV sector from 35 per cent in 1992 to 15 per cent on 1 January 2000. Tariff phasing previously announced in the Government's 1987 TCF Industry Plan was accelerated, so that by 1 July 2000 the maximum TCF tariff would be 25 per cent.

In 1997, the Government confirmed the previously announced schedule for TCF and PMV tariff phasing and also announced further tariff reductions to take effect on 1 January 2005. By 1 January 2005, the maximum tariffs for PMV items are scheduled to be 10 per cent, while tariffs for TCF items are to fall to between 7.5 per cent and a maximum of 17.5 per cent. The phasing of TCF and PMV tariffs is not expected to have any impact on the proportion of tariff items at the 5 per cent level or less, as only tariff rates of 10 per cent and above are scheduled to be phased downwards.

Overall, the phasing arrangements over the last decade have had a substantial impact on the level and dispersion of tariffs. For example, the highest tariff rate for any one line item (inclusive of the effect of tariff quotas) will have declined from 125 per cent in 1989-90 (for a TCF item) to a projected 17.5 per cent at 1 January 2005.

Sectoral decomposition

At 1 January 2001, tariff items with a general rate of 5 per cent or less are expected to account for around 85 per cent of all tariff items.[3] The distribution of items with different rates, however, is not uniform across sectors (table B.1). Items in the agricultural and mining industries predominantly have general rates of zero, while for most manufacturing industries the number of items with a 5 per cent general rate typically outweighs the number of zero-rated items.

[3] Those under reference will account for around 80 per cent.

Table B.1 **Incidence of 8-digit tariff line items by general tariff rate and characteristic industry sector,[a] 1 January 2001[b]** (number)

ANZSIC Industry	*0*	*1<5*	*5*	*6<10*	*10*	*>10*	*Specific rate items[c]*	***Total***
Agriculture, forestry, fishing and hunting	193	0	11	0	0	0	0	204
Mining	84	0	9	0	0	0	0	93
Manufacturing								
Food, beverages and tobacco	293	12	132	0	0	0	26	463
Textiles, clothing, footwear and leather	179	0	217	0	122	522	0	1040
Wood and paper products	75	0	156	0	0	0	0	231
Printing, publishing and recorded media	30	0	23	0	0	0	0	53
Petroleum, coal, chemical and associated products	632	0	362	0	6	26	20	1046
Non-metallic mineral products	72	0	96	0	0	4	0	172
Basic metal products	151	0	219	0	0	0	0	370
Fabricated metal products	59	0	172	0	0	10	0	241
Motor vehicles and parts	42	0	80	0	2	80	8	212
Other vehicles	24	0	27	0	0	0	0	51
Other machinery and equipment	711	0	553	0	3	37	0	1304
Other manufacturing	67	0	105	0	1	3	0	176
Other and unspecified[d]	287	0	86	0	5	10	10	398
Total	**2899**	**12**	**2248**	**0**	**139**	**692**	**64**	**6054**

a A number of 8-digit tariff items are allocated to more than one ANZSIC industry in international trade data (ABS, Cat. no. 5464.0). In assessing the distribution of tariffs by ANZSIC industry, the same tariff item can therefore be counted a number of times. **b** Based on 1 January 2001 tariff rates and a concordance between that rates schedule, the 1998-99 tariff schedule and 1998-99 international trade data classified by ANZSIC (the trade reference year selected for this analysis). **c** Specific rate items refer to those items for which the tariff is defined either in terms of a dollar amount per unit imported or in terms of a dollar and an ad valorem amount. For example, duty on cheese is levied at $1.22 per kilogram. **d** Includes ANZSIC category 4714 (fish wholesaling), confidential and non-confidential items not allocated to ANZSIC industry, and items where there was no trade in 1998-99.

Source: The Australian Customs Tariff; ABS (*International Trade Data*, Cat. no. 5464.0).

The relatively high general rates associated with the TCF and PMV plans extend beyond those specific sectors to cover products in other industries. These industries include Other vehicles, machinery and equipment, Petroleum, coal, chemical and associated products, and Metal products.

The main industry with general rates exceeding 5 per cent, not associated with the TCF and PMV plans, is Food, beverages and tobacco. The high rates in this industry are specific rate tariffs on cheese imports. At 1 January 2001, cheese imports will incur a specific tariff rate of $1.22 per kilogram, which on conversion to an ad valorem rate represents one of the highest tariff equivalent rates in the Australian Customs Tariff Schedule — around 50 per cent.

Other specific rate items are associated with imports of second hand cars and excise on alcohol, tobacco and fuel. For the purpose of this analysis, excise items are recorded in the specific rate group and assigned a zero protective tariff.

A general rate of duty of zero applies to over 50 per cent of all imports (expressed in value terms) (table B.2). Over 35 per cent of imports by value are subject to general rates of 5 per cent.

The duty collected on imports is influenced by the applicable general rate and concessional arrangements (see below) in force. When both of these factors are taken into account, the duty collected for items with a general rate of 5 per cent or less is only around 35 per cent of total duty collected (table B.3), whereas these items account for over 85 per cent of imports by value.

The TCF and motor vehicles and parts industries, which account for over 40 per cent of total duty paid, account for only around 15 per cent of imports by value. In addition, the duty collected from specific rate items accounts for around 25 per cent of all duty paid, and includes excise on imports of excisable commodities that account for less than one per cent of imports by value.

Table B.2 **Imports CIF by general tariff rate on 8-digit tariff line items at 1 January 2001 and characteristic industry sector[a]**
($million 1998-99)

ANZSIC Industry	*0*	*1<5*	*5*	*6<10*	*10*	*>10*	*Specific rate items[b]*	***Total***
Agriculture, forestry, fishing and hunting	851	0	36	0	0	0	0	887
Mining	4374	0	13	0	0	0	0	4386
Manufacturing								
Food, beverages and tobacco	2163	544	1191	0	0	0	197	4095
Textiles, clothing, footwear and leather	700	0	1300	0	442	3947	0	6389
Wood and paper products	927	0	2453	0	0	0	0	3379
Printing, publishing and recorded media	1953	0	298	0	0	0	0	2251
Petroleum, coal, chemical and associated products	8227	0	6230	0	106	904	443	15910
Non-metallic mineral products	211	0	1209	0	0	31	0	1451
Basic metal products	2931	0	2021	0	0	0	0	4952
Fabricated metal products	314	0	2461	0	0	285	0	3059
Motor vehicles and parts	679	0	4375	0	17	3795	76	8941
Other vehicles	2973	0	222	0	0	0	0	3195
Other machinery and equipment	21049	0	12868	0	31	1082	0	35031
Other manufacturing	476	0	2420	0	22	49	0	2967
Other and unspecified[c]	5295	0	55	0	0	161	0	5511
Total	**53122**	**544**	**37152**	**0**	**617**	**10255**	**716**	**102406**

a The value of imported goods at the foreign port of shipment plus the costs of freight and merchandise insurance. The CIF value is a representative landed price of imports in an Australian port. **b** Specific rate items refer to those items for which the tariff is defined either in terms of a dollar amount per unit imported or in terms of a dollar and an ad valorem amount. For example, duty on cheese is levied at $1.22 per kilogram. **c** Includes ANZSIC category 4714 (fish wholesaling) and confidential and non-confidential items not allocated to ANZSIC industry.

Source: The Australian Customs Tariff; ABS (*International Trade Data*, Cat. no. 5464.0).

Table B.3 **Duty paid by general tariff rate on 8-digit tariff line items at 1 January 2001 and characteristic industry sector[a]**
($million 1998-99)

ANZSIC Industry	*0*	*1<5*	*5*	*6<10*	*10*	*>10*	*Specific rate items[b]*	***Total***
Agriculture, forestry, fishing and hunting	0	0	2	0	0	0	0	2
Mining	0	0	0	0	0	0	0	1
Manufacturing								
Food, beverages and tobacco	1	16	45	0	0	0	989	1050
Textiles, clothing, footwear and leather	0	0	41	0	32	738	0	811
Wood and paper products	0	0	64	0	0	0	0	64
Printing, publishing and recorded media	0	0	11	0	0	0	0	11
Petroleum, coal, chemical and associated products	3	0	214	0	4	53	32	306
Non-metallic mineral products	1	0	45	0	0	1	0	47
Basic metal products	1	0	54	0	0	0	0	55
Fabricated metal products	1	0	88	0	0	11	0	100
Motor vehicles and parts	0	0	242	0	1	679	10	932
Other vehicles	0	0	6	0	0	0	0	6
Other machinery and equipment	56	0	409	0	2	32	0	499
Other manufacturing	0	0	70	0	2	1	0	74
Other and unspecified[c]	1	0	1	0	0	4	0	6
Total[d]	**63**	**16**	**1292**	**0**	**41**	**1520**	**1031**	**3962**

a Includes anti-dumping duties. **b** Includes duty on excisable commodities. Specific rate items refer to those items for which the tariff is defined either in terms of a dollar amount per unit imported or in terms of a dollar and an ad valorem amount. For example, duty on cheese is levied at $1.22 per kilogram. **c** Includes ANZSIC category 4714 (fish wholesaling) and confidential and non-confidential items not allocated to ANZSIC industry. **d** Budget estimates for duty receivable (excluding excise) in the financial year 1999-2000 amount to $2700 million.

Source: The Australian Customs Tariff; ABS (*International Trade Data*, Cat. no. 5464.0).

Exemptions and concessions

The general tariff rate is the main instrument by which tariff arrangements affect import prices and duty payments. Nevertheless, the general rate is modified in a number of ways by duty exemptions and concessions and is also subject to change during a particular year. Each of these factors requires special treatment in assessing the likely initial import price effect of a change in the tariff.

First, imports from certain sources (eg including New Zealand, Papua New Guinea, the Forum Islands and some developing countries) are given duty free status. This duty free entry is generally granted either to countries with a cost structure similar to Australia or to compensate for a trade disadvantage not typical of most countries exporting to Australia. The main effect of these arrangements is therefore likely to be to divert some trade to these sources, rather than to lower the price of imports (after duty). Consequently, a change in the Australian general tariff rate is assumed to lead to a proportional change in the price of imports from these sources.

Second, arrangements such as the Tariff Concession System (TCS), Project and other policy by-laws, Duty drawback scheme, Manufacture in Bond scheme, Tariff Export Concession (TEXCO) system, and TRADEX scheme (to be introduced in 2000) typically lower the operative tariff rate from the general rate to zero or a concessional rate. The schemes and the concessional rates applicable have changed over time. For example, the TCS was introduced in 1992 to replace the Commercial Tariff Concession Order (CTCO) system. Initially, Tariff Concession Orders (TCOs) were admitted duty free. From July 1996 a concessional rate of 3 per cent has applied to TCOs on business inputs, while goods for final consumption remained duty free. The operative tariff rate for concessional imports is used as the appropriate benchmark for policy analysis of tariff rate changes. A change in tariff arrangements therefore is assumed to affect the landed duty paid import prices only when the general rate is reduced below the concessional rate (ie the concession becomes inoperative) or when the concession arrangement itself is changed.

Third, certain government imports enter free of duty. A change in the general tariff rate is assumed not to affect the landed duty paid price of such imports.

Imports with general rates of 5 per cent or less entering under TCO arrangements account for nearly 60 per cent of the total value of concessional imports (table B.4). They also represent more than 10 per cent of all imports with a general rate of 5 per cent or less and thus have a substantial impact on the user cost of these imports. Furthermore, over 90 per cent of TCO imports with general rates greater than 5 per cent are associated with items covered by the PMV and TCF plans.

Concessional import arrangements applying to items with a general rate of 5 per cent or more are concentrated in the Motor vehicles and parts, Other machinery and equipment, Petroleum, coal, chemical and associated products, TCF and Fabricated metal products subdivisions. For general rates greater than 5 per cent, commodities associated with the PMV and TCF plans accounted for over 95 per cent of all concessional imports.

The Other machinery and equipment industries account for over 40 per cent of imports, by value, entering under concessional arrangements. The concentration of

concessional entry in this sector reflects the fact that such products are often of a specialised nature with high unit values, making it practicable and worthwhile for importers to apply for concessional entry.

Table B.4 **Tariff Concession Order (TCO) and other concessional imports by general tariff rate on 8-digit tariff line items at 1 January 2001 and characteristic industry sector** ($million 1998-99)

	TCO imports			*Other concessional imports*			
ANZSIC Industry	*0<5*	*5*	*>5*	*0<5*	*5*	*>5*	*Total*
Agriculture, forestry, fishing and hunting	0	0	0	0	0	0	0
Mining	1	0	0	0	0	0	1
Manufacturing							
Food, beverages and tobacco	2	0	0	0	0	0	2
Textiles, clothing, footwear and leather	1	341	103	1	1	411	859
Wood and paper products	0	181	0	0	252	0	434
Printing, publishing and recorded media	144	17	0	1	0	0	162
Petroleum, coal, chemical and associated products	74	1893	142	450	45	488	3093
Non-metallic mineral products	7	151	0	0	14	18	191
Basic metal products	7	633	0	0	54	0	694
Fabricated metal products	10	402	32	46	116	223	827
Motor vehicles and parts	26	396	75	25	330	2418	3270
Other vehicles	0	28	0	328	0	0	357
Other machinery and equipment	1377	4550	361	188	426	594	7495
Other manufacturing	43	607	9	1	5	34	698
Other and unspecified[a]	0	32	42	38	0	13	125
Total	**1692**	**9232**	**763**	**1079**	**1243**	**4199**	**18209**

a Includes ANZSIC category 4714 (fish wholesaling) and confidential and non-confidential items not allocated to ANZSIC industry.

Source: The Australian Customs Tariff; ABS (*International Trade Data*, Cat. no. 5464.0).

B.3 The impact of tariff reductions on import prices

Data on the value of imports, the general rate to apply at 1 January 2001 and concessional arrangements, have been used to calculate the import price effects of removing tariffs on items under reference.

Tariff items not under reference have been identified in two ways. First, items with general rates above 5 per cent are treated as 'not under reference'. This criterion applies to most items in the TCF and PMV plans, as well as cheese. Second, some information provided by the Department of Industry, Science and Resources has been used to help identify TCF and PMV plan imports entering at a 5 per cent rate under current arrangements. Plan items entering at a general rate of 5 per cent include light commercial vehicles and four wheel drives. All items so identified are treated as not under reference for the purpose of this study.

The import price effects of prospective tariff reductions are estimated for each of the 115 commodity groups in MONASH. Because nearly all items subject to duty are manufactures, actual import price changes are entered only for the 66 manufacturing industries included in the model.

Table B.5 presents the estimated import price effects of removing tariffs on items under reference by MONASH commodity, using 1998-99 import values as weights.[4] The largest import price reductions would be for railway equipment, where the landed duty paid price of imports would fall by around 5 per cent. For many of the model's commodity groups, however, the removal of tariffs under reference would have no impact on the landed duty paid price of imports, either because there were no imports of these commodities or because their tariff rates were zero.

For items under reference, a distinction is also made between concessional and non-concessional imports. The removal of the 5 per cent general rate, relative to setting concessional rates equal to zero, is the main contributor to import price reductions for individual commodities.

To place the import price effects of the items under reference in the context of all tariffs, the potential import price impacts of removing tariffs on items not under reference are also shown in table B.5.

As expected, any such future impact would focus on items in the TCF and PMV sectors. For example, the landed duty paid price of imports in the clothing sector would be expected to fall by around 17 per cent, while for motor vehicles and parts the landed duty paid price of imports would fall by about 6 per cent.

4 As noted in chapter 1, the import price effects in table B.5 are sufficiently close to those in the draft report (which used 1996-97 import values as weights) as not to warrant an updating of the model results presented in chapter 1. This maintains comparability between the Commission's model results and additional analysis done for the Commission by the Centre of Policy Studies.

Table B.5 **Import price effects of the removal of tariffs on items under reference and illustrative price effects for items not under reference**[a] (per cent)

	Items under reference			
MONASH commodity	*Concession rates to zero*	*5 per cent general rates to zero*	*Total*	*Items not under reference*
Meat and meat products	0.0	-0.5	-0.5	-0.5
Dairy products	0.0	-1.1	-1.1	-9.9
Fruit and vegetable products	0.0	-3.1	-3.1	-0.1
Oils and fats	0.0	-0.5	-0.5	0.0
Flour and cereal foods	0.0	-2.9	-3.0	0.0
Bakery products	0.0	-4.2	-4.2	0.0
Confectionery	0.0	-2.5	-2.5	0.0
Other food products	0.0	-0.9	-0.9	0.0
Soft drinks, cordials, syrups	0.0	-3.1	-3.1	-1.0
Beer and malt	0.0	0.0	0.0	0.0
Wine and spirits	0.0	-4.4	-4.4	0.0
Tobacco products	0.0	0.0	0.0	-0.9
Wool scouring	0.0	0.0	0.0	0.0
Synthetic fibre textiles	0.0	0.0	0.0	-5.2
Cotton textiles	0.0	-0.1	-0.2	-4.4
Wool textiles	0.0	0.0	0.0	-8.6
Textile finishing	0.0	-0.2	-0.2	-8.1
Made-up textile products	0.0	-0.4	-0.4	-6.9
Textile floor coverings	0.0	0.0	0.0	-8.5
Knitting mill products	0.0	0.0	0.0	-16.3
Clothing	0.0	0.0	0.0	-16.7
Footwear	0.0	0.0	0.0	-12.1
Leather and leather products	0.0	-2.9	-2.9	-1.1
Sawmill products	-0.1	-3.5	-3.5	0.0
Plywood and veneers	-0.3	-3.9	-4.1	0.0
Fabricated wood products	-0.1	-2.5	-2.6	-2.1
Pulp, paper and paperboard	-0.1	-2.2	-2.3	0.0
Paper and paperboard containers	-0.3	-3.8	-4.1	0.0
Paper products nec	-0.1	-1.9	-2.0	-0.8
Printing, services to printing	0.0	-1.6	-1.6	0.0
Publishing recorded media etc	0.0	0.0	0.0	0.0
Petroleum and coal products	0.0	0.0	0.0	0.0
Fertilizers	0.0	0.0	0.0	0.0
Industrial, organic and inorganic chemicals	-0.5	-1.1	-1.6	0.0
Paints	-0.3	-3.9	-4.2	0.0
Pharmaceuticals etc	-0.1	-0.3	-0.4	0.0
Soap and detergents	-0.1	-3.9	-4.0	-0.3
Cosmetics and toiletries	0.0	-4.3	-4.3	-0.1
Other chemical products	-0.4	-1.4	-1.8	-0.1
Rubber products	-0.5	-0.6	-1.1	-4.3
Plastic products	-0.5	-3.1	-3.6	-0.2

(continued next page)

Table B.5 (continued)

MONASH commodity	Items under reference: Concession rates to zero	Items under reference: 5 per cent general rates to zero	Items under reference: Total	Items not under reference
Glass and glass products	-0.1	-1.8	-2.0	-0.6
Ceramic products	-0.2	-3.9	-4.1	0.0
Cement and lime products	0.0	0.0	0.0	0.0
Concrete slurry	0.0	0.0	0.0	0.0
Plaster; other concrete products	0.0	-3.6	-3.6	0.0
Non-metallic min. products nec	-0.4	-3.0	-3.4	-0.4
Iron and steel	-0.4	-1.4	-1.8	0.0
Basic non-ferrous metals etc	-0.3	-1.8	-2.1	0.0
Structural metal products	-0.1	-4.0	-4.2	0.0
Sheet metal products	-0.4	-3.5	-3.8	0.0
Fabricated metal products	-0.3	-2.5	-2.8	-0.6
Motor vehicles and parts etc	-0.1	-0.4	-0.5	-5.5
Ships and boats	0.0	-1.0	-1.0	0.0
Railway equipment	-0.1	-4.5	-4.6	0.0
Aircraft	0.0	0.0	0.0	0.0
Scientific etc equipment	-0.2	-0.5	-0.7	0.0
Electronic equipment	-0.1	-0.3	-0.3	0.0
Household appliances	-0.3	-2.8	-3.1	-0.1
Cables and electrical equipment nec	-0.3	-1.9	-2.2	-0.5
Agricultural machinery	-0.2	-1.3	-1.5	-0.1
Mining and construction machinery	-0.7	-1.8	-2.5	0.0
Other machinery and equipment	-0.5	-1.5	-2.0	-0.4
Prefabricated buildings, furniture	0.0	-3.7	-3.8	-0.2
Electric lights and signs	-0.6	-2.9	-3.4	0.0
Other manufacturing	-0.1	-2.2	-2.2	-0.1

a Estimates of import price changes are based on import-weighted tariff rates. Import clearances for individual items in 1998-99 are used as weights. The percentage change in the landed duty paid import price is estimated for each commodity group using the general formula $PoT = -t_m / (1 + t_0)$, where t_m is the import price-raising effect of selected interventions (eg the concessional rate, rate for general entry items) and t_0 is the import price-raising effect of all border interventions. The power of the tariff (*PoT*) is a measure of the import price-raising effects of tariffs. A negative thus indicates that removing tariffs on items under reference would lower the ldp price of imports

Source: PC estimates.

Items not under reference extend to products produced in a number of industries under the TCF and PMV sectoral plans. The landed duty paid price of imports for the rubber sector, for example, would be expected to decline by around 4 per cent if tariffs not under reference were removed.

The effects of postulated tariff changes on the prices paid by industrial and final users are moderated by a number of factors.

First, the value for duty for applying the Australian Customs Tariff is conventionally defined in terms of the value of the dutiable commodity at the foreign port (ie the fob (free on board) value). However, the value most relevant for assessing the border price effects of the tariff is the landed duty paid value of imports, where the landed cost of imports is represented by the cif (cost insurance and freight) value of imports in international trade statistics. The analysis of possible tariff reductions is therefore benchmarked to the landed duty paid value of imports.

For a typical import for which insurance and freight costs add about 6 per cent to the fob value of imports, a 5 per cent tariff on the fob value would translate to a 4.7 per cent tariff equivalent on the cif value of imports (ie 0.047=5/106). Taking this example one step further, the removal of a 5 per cent tariff would reduce the landed duty paid price of imports by approximately 4.5 per cent (ie -0.045= - 5/(106+5) or equivalently - 4.7/(100+4.7). The latter formulation is adopted in table B.5.

Second, the cost of imports and (other items) to purchasers also includes domestic transport and distribution margin services. These are assumed to be largely unaffected by tariff changes. Information drawn from ABS input-output tables indicates that domestic transport and distribution costs amount to about 32 per cent of the basic price (ie the landed duty paid value in the case of imports) of manufacturing items in 1993-94.[5] Product taxes (eg excise and sales tax) also contribute to the purchasers' price of imports and amount to around 10 per cent of the basic price. These averages vary substantially between commodities, with the lowest rates applying to bulk commodities such as chemicals and basic metals, and the highest to goods used in household consumption (table B.6).

Once the costs of international transportation, and domestic transport and distribution are taken into account, the additional pressure on domestic industries from changes in the border price of imports is therefore somewhat less than is indicated by a direct inspection of tariff rates alone.[6]

5 This is the latest year for which published data are available with full information on margins.

6 The price effects of removing tariffs are introduced to the model in terms of basic prices (ie the landed duty paid price for imports). In estimating the effects of those price changes to the consumer and industrial users, the model uses information about the incidence of margins by commodity and category of use.

Table B.6 **Estimated effects on purchasers' prices of imported supplies from removing tariffs under reference[a]** (per cent)

		Household consumption		*Other domestic uses*	
MONASH commodity	*Price effect of reduction at basic prices*	*Margins as a propn of basic prices*	*Price effect of reduction at purchasers' prices*	*Margins as a propn of basic prices*	*Price effect of reduction at purchasers' prices*
Meat and meat products	-0.5	67.4	-0.3	5.3	-0.5
Dairy products	-1.1	55.6	-0.7	5.5	-1.1
Fruit and vegetable products	-3.1	66.5	-1.8	14.2	-2.7
Oils and fats	-0.5	41.4	-0.4	5.7	-0.5
Flour and cereal foods	-3.0	46.5	-2.0	2.0	-2.9
Bakery products	-4.2	50.2	-2.8	10.0	-3.8
Confectionery	-2.5	113.9	-1.2	2.7	-2.4
Other food products	-0.9	45.3	-0.6	4.4	-0.9
Soft drinks, cordials, syrups	-3.1	60.4	-1.9	4.4	-2.9
Beer and malt	0.0	237.8	0.0	1.9	0.0
Wine and spirits	-4.4	323.1	-1.0	20.1	-3.7
Tobacco products	0.0	679.7	0.0	54.4	0.0
Wool scouring	0.0	0.0	0.0	0.0	0.0
Synthetic fibre textiles	0.0	83.1	0.0	-1.2	0.0
Cotton textiles	-0.2	84.5	-0.1	1.9	-0.2
Wool textiles	0.0	89.3	0.0	-2.5	0.0
Textile finishing	-0.2	139.2	-0.1	0.1	-0.2
Made-up textile products	-0.4	62.5	-0.3	2.0	-0.4
Textile floor coverings	0.0	69.6	0.0	10.9	0.0
Knitting mill products	0.0	124.2	0.0	0.4	0.0
Clothing	0.0	89.4	0.0	3.3	0.0
Footwear	0.0	92.9	0.0	2.2	0.0
Leather and leather products	-2.9	126.3	-1.3	0.1	-2.9
Sawmill products	-3.5	65.1	-2.1	3.0	-3.4
Plywood and veneers	-4.1	98.8	-2.1	-0.2	-4.1
Fabricated wood products	-2.6	103.5	-1.3	4.0	-2.5
Pulp, paper and paperboard	-2.3	149.6	-0.9	2.7	-2.3
Paper and paperboard containers	-4.1	106.2	-2.0	7.2	-3.8
Paper products nec	-2.0	162.5	-0.8	13.8	-1.8
Printing, services to printing	-1.6	100.0	-0.8	3.2	-1.6
Publishing recorded media etc	0.0	100.9	0.0	20.4	0.0
Petroleum and coal products	0.0	170.9	0.0	56.5	0.0
Fertilizers	0.0	60.6	0.0	-4.4	0.0
Industrial, organic and inorganic chemicals	-1.6	32.7	-1.2	1.1	-1.6
Paints	-4.2	65.6	-2.5	0.7	-4.2
Pharmaceuticals etc	-0.4	265.0	-0.1	0.9	-0.4
Soap and detergents	-4.0	82.2	-2.2	3.5	-3.8
Cosmetics and toiletries	-4.3	195.2	-1.5	0.8	-4.3

(continued next page)

Table B.6 (continued)

MONASH commodity	Price effect of reduction at basic prices	Household consumption: Margins as a propn of basic prices	Household consumption: Price effect of reduction at purchasers' prices	Other domestic uses: Margins as a propn of basic prices	Other domestic uses: Price effect of reduction at purchasers' prices
Other chemical products	-1.8	125.9	-0.8	4.6	-1.7
Rubber products	-1.1	130.0	-0.5	33.8	-0.8
Plastic products	-3.6	91.4	-1.9	1.6	-3.5
Glass and glass products	-2.0	195.7	-0.7	5.4	-1.9
Ceramic products	-4.1	200.4	-1.4	0.8	-4.1
Cement and lime products	0.0	19.0	0.0	-0.2	0.0
Concrete slurry	0.0	0.0	0.0	0.0	0.0
Plaster; other concrete products	-3.6	121.3	-1.6	0.0	-3.6
Non-metallic min. products nec	-3.4	127.3	-1.5	0.2	-3.4
Iron and steel	-1.8	76.0	-1.0	-0.5	-1.8
Basic non-ferrous metals etc	-2.1	15.7	-1.8	0.0	-2.1
Structural metal products	-4.2	17.2	-3.5	0.2	-4.1
Sheet metal products	-3.8	84.4	-2.1	1.1	-3.8
Fabricated metal products	-2.8	146.3	-1.2	3.6	-2.7
Motor vehicles and parts etc	-0.5	90.7	-0.2	20.1	-0.4
Ships and boats	-1.0	66.9	-0.6	-0.3	-1.0
Railway equipment	-4.6	0.0	-4.6	0.0	-4.6
Aircraft	0.0	1.1	0.0	0.2	0.0
Scientific etc equipment	-0.7	116.6	-0.3	9.7	-0.7
Electronic equipment	-0.3	156.7	-0.1	4.7	-0.3
Household appliances	-3.1	73.3	-1.8	5.7	-3.0
Cables and electrical equipment nec	-2.2	101.7	-1.1	4.0	-2.2
Agricultural macinery	-1.5	50.6	-1.0	-2.2	-1.6
Mining and construction machinery	-2.5	22.6	-2.1	1.3	-2.5
Other machinery and equipment	-2.0	53.8	-1.3	0.5	-2.0
Prefabricated buildings, furniture	-3.8	84.4	-2.0	2.7	-3.7
Electric lights and signs	-3.4	157.9	-1.3	29.3	-2.7
Other manufacturing	-2.2	129.7	-1.0	1.6	-2.2

a The implied price effect at purchasers' prices (columns 3 and 5) is equal to the basic value price multiplied by 1 plus the power of margins (ie margins as a proportion of basic price flow shown in columns 2 and 4 divided by 100).

Source: MONASH model database; PC estimates.

B.4 The impact of tariffs on assistance to the manufacturing industry

Tariffs, by raising the price of imports, provide assistance to local producers of items subject to tariffs and impose a tax on the inputs of those producers using imported items and locally made import substitutes.

The subsidising and taxing effects of tariffs thereby influence the allocation of resources between different industries or activities in the economy. The Commission uses the *effective rate of assistance* to summarise the initial price impact of tariffs on the net returns to value adding factors — land, labour and fixed capital. This measure provides a basis for assessing the extent to which tariff assistance may affect the incentives people face to engage in certain activities.

For this study, the Commission has estimated the effective rate of assistance from tariffs for ANZSIC-based manufacturing industry subdivisions for 1996-97, 2000-01 and 2005-06 (table B.7). In addition, the Commission has estimated the impact on effective rates of removing tariffs on items under reference for the years 2000-01 and 2005-06.[7]

Table B.7 **Estimated effective rates of assistance by manufacturing industry subdivision, and the effect of removing tariffs under reference[ab]** (per cent)

		2000-01		*2005-06*	
Industry	*1996-97*	*Current arrange-ments*	*With removal of tariff under reference*	*Current arrange-ments*	*With removal of tariff under reference*
Food, beverages and tobacco	4.4	4.2	1.3	4.2	1.3
Textiles, clothing, footwear and leather	32.2	21.3	21.9	14.7	15.2
Wood and paper products	5.5	5.5	-0.1	5.6	-0.1
Printing, publishing and recorded media	0.9	0.9	-0.1	0.9	0.0
Petroleum, coal, chemical and associated products	4.5	4.5	0.7	4.3	0.5
Non-metallic mineral products	2.7	2.6	0.1	2.6	0.1
Basic metal products	3.6	3.6	0.0	3.6	0.0
Fabricated metal products	4.6	4.5	0.2	4.4	0.1
Motor vehicles and parts	21.3	14.5	13.3	9.8	8.6
Other vehicles	-0.7	-0.6	-0.1	-0.6	-0.1
Other machinery and equipment	2.7	2.2	0.3	2.1	0.2
Other manufacturing	4.8	4.8	-0.2	4.8	-0.1
Total	**5.8**	**5.0**	**2.2**	**4.4**	**1.6**

a Rates at 1 July 2000 and 1 January 2005 are assumed to apply for the periods 2000-01 and 2005-06, respectively. **b** The estimates of effective assistance differ fractionally from those presented in earlier Commission studies (eg IC 1995). The main reason for the difference is an updating of industry output and input weights undertaken for this study (see box B.1).

Source: PC estimates.

[7] The effective rate calculations use import price effects for the 66 MONASH manufacturing industries. The effective rates have not been updated to incorporate import price effects calculated using 1998-99 rather than 1996-97 import values as weights.

From 1996-97 to 2005-06 under current arrangements, the major changes to effective assistance would be in the textiles, clothing, footwear and leather, and motor vehicles and parts industries. These reductions reflect the impact of phased tariff reductions to 2005 under the TCF and PMV plans. Other industries to be affected by phasing arrangements are the petroleum, coal and chemical products, fabricated metal products and other machinery and equipment industries (also see table B.5).

Phased tariff reductions under the TCF and PMV plans, however, are not the only factors contributing to lower effective assistance. Lower specific rate tariffs on cheese imports and a restructuring of the tariff schedule between 1996-97 and 2000-01 are also expected to contribute to lower effective assistance for some industries. For example, effective assistance for Food, beverages and tobacco is expected to decrease from 4.4 per cent in 1996-97 to 4.2 per cent in 2000-01.

The removal of tariffs on items under reference would lower assistance to output and lower the cost of inputs to industry. These two effects have opposite impacts on the estimated effective rates of assistance. Lower assistance to output would reduce effective rates while lower input costs would increase effective rates, all other things remaining equal. The overall impact of removing tariffs therefore would depend on the impact of changes in assistance to output relative to changes in the impost of assistance on the cost of inputs.

For most manufacturing industries, the net effect of removing tariffs on items under reference would be lower effective rates of assistance than those that would otherwise apply in 2000-01 and 2005-06. This occurs as the reduction in assistance to output is estimated to exceed the corresponding reductions in the cost of inputs. For example, in the other machinery and equipment industry, the reduction in assistance to output for 2000-01 is estimated to exceed the reduction in the costs of inputs so that effective assistance declines from 2.2 per cent to 0.3 per cent. The effective assistance, however, is not eliminated because some activities in the other machinery and equipment industry are supported by PMV arrangements.

While assistance to output would be removed for most activities, part of the impost of tariffs on industry costs associated with the use of TCF and PMV items would remain. For activities that use significant TCF or PMV inputs, effective assistance afforded by tariffs would decline. For example, for other manufacturing, effective assistance is estimated to decline from 4.8 per cent in 1996-97 to -0.2 per cent in 2000-01.

On the other hand, the extent of tariffs on TCF items that are *not* under reference exceeds that of tariffs on items used by TCF activities. The removal of tariffs on items under reference, therefore, would have little effect on assistance to TCF

outputs, but would lower input costs by removing tariffs on materials used by TCF activities. These changes would raise effective assistance to TCF activities overall. For example, effective assistance to the textiles, clothing, footwear and leather subdivision would increase fractionally from 21.3 per cent in 1996-97 to 21.9 per cent in 2000-01.

The motor vehicles and parts subdivision has a larger proportion of its output covered by tariff items under reference than does the textiles, clothing, footwear and leather subdivision. The impact of removing tariffs on items under reference, therefore, would have a larger impact on effective assistance to motor vehicles and parts subdivision as a whole than it would for the TCF sector. Overall, effective assistance to the motor vehicles and parts subdivision is estimated to decline with the removal of tariffs on items under reference — from 14.5 per cent in 1996-97 to 13.3 per cent 2000-01. As some individual activities within the motor vehicles and parts subdivision would remain relatively highly assisted after the removal of tariffs on items under reference, this reduction is substantially below the manufacturing average.

Box B.1 **Effective rates of assistance**

The effective rate of assistance is useful for assessing the extent to which assistance may alter the incentives to engage in particular economic activities. It is defined as the percentage change in returns per unit of output to an activity's value-adding factors due to the assistance structure. The effective rate measures net assistance by taking into account the costs and benefits of government intervention on outputs and inputs and direct assistance to value-adding factors.

Details about industry outputs and inputs are revised periodically to take account of compositional changes that occur over time. Factors that influence compositional changes include changes in technology and relative prices. The last major update of output and input shares was undertaken for the reference year 1989-90.

For this study, production weights reflecting the composition of output and material input weights have been updated from 1989-90 values to 1994-95 values using information from the 1994-95 ABS input-output tables. However, in order to maintain broad consistency between the present study and earlier studies of manufacturing assistance, the 1989-90 definition and measure of the 'value added' share in output — a measure essential for estimating effective rates of assistance — has been retained. That definition includes certain overhead expenses in value added which are not included in the input-output definition of value added.

A more detailed discussion of the methodology used to calculate assistance is provided in the Commission's report on *Assistance to Agricultural and Manufacturing Industries* (IC 1995).

C Productivity improvements

There is a growing body of empirical evidence suggesting that more liberal trade policies and trade openness are associated with faster growth (eg World Bank 1987, Edwards 1993, Lee 1993, Harrison 1996, EPAC 1996 and Frankel and Romer 1999). Campbell (1998) is one attempt to provide a theoretical justification for these effects. Traditional trade theory suggests that the relationship is ambiguous, so the question may ultimately be an empirical one. Typically, the empirical evidence of links between trade policy, openness and growth is examined in a cross-country context.

Rodríguez and Rodrik (2000) have recently criticised a number of these cross-country studies. They note that studies of *openness* and growth do not establish a connection between *trade policy* and growth. They also note that in a cross-country context, it is very difficult to control for all the other factors that influence growth rates across countries.

A recent study by Stoeckel, Tang and McKibbin (1999) used a dynamic multicountry model to analyse the impact of endogenous productivity improvements from further opening economies in the Asia-Pacific region to trade.

Chand, McCalman and Gretton (1998) examined time series evidence of the impact of tariff reductions on manufacturing industry productivity growth in Australia using data for 8 manufacturing industry subdivisions over the period 1968-69 to 1994-95. By using an explicit measure of tariff reductions and by tracing their effects on industries over time in a single country, they overcome many of the criticisms of Rodríguez and Rodrik (2000).

After controlling for cyclical and structural influences on growth in industry gross product, Chand, McCalman and Gretton (1998) found that tariff reductions raised manufacturing industry productivity. On average, a 1 per cent reduction in industry assistance led to a 0.15 per cent increase in value added.

Table C.1 **Estimated effect of a 1 per cent reduction in industry assistance on value added output by manufacturing industry**

Panel[a]	*FBT*	*TCF*	*Printing etc*	*Petroleum etc*	*Basic metals*	*Structural metals*	*Transport equip.*	*Other*
0.15	0.02	0.63	0.28	0.01	0.16	0.28	0.29	0.23

a Pooled Ordinary Least Squares (OLS) for the panel of industry subdivisions.

Source: Chand, McCalman and Gretton (1998).

At the subdivision level, tariff reductions improved productivity in each of the industries examined (table C.1), though there were substantial differences between industries. For the industries under reference, the largest productivity improvements associated with a given tariff reduction were estimated to have occurred in the printing and media and structural metal products industries.

In response to comments at the modelling workshop, the industry-specific elasticities in table C.1 were used in preference to the manufacturing average elasticity in determining the productivity improvements to include in the MONASH model, for both the draft and final reports.

There are three features of the econometric analysis that need to be kept in mind. First, the elasticities are based on evidence for the whole period, which included times of relatively high and low assistance. The data were not rich enough to detect any variation in the estimated elasticities according to the level of assistance. The available estimates could overstate the impact of future assistance reductions if most of the benefits from opening the economy have already been reaped.

Second, the econometric study used the Commission's nominal rate of assistance to output as its measure of border restrictions. This is defined as the 'percentage change in gross returns per unit of output relative to the (hypothetical) situation of no assistance'. It excludes the impact of border restrictions on input prices, an effect taken into account in measures of effective assistance to industry (see appendix B), and one that may also affect industry productivity. While changes in nominal and effective rates of assistance are positively correlated, the data in the original study were not rich enough to identify separately the impact of changes in assistance to inputs on productivity growth. But if assistance reductions in one industry *lower* the cost of inputs to other industries, and if the firms in those other industries use the cost reductions to operate less efficiently (the 'warm sun' effect), the estimates could overstate the overall impact of border assistance reductions on productivity.

Third, while the econometric study examined the impact of changes in assistance on industry value added, it did not examine the impact on the productivity of material

and service inputs. If assistance reductions also lead to improvements in the use of material and service inputs, the available estimates could understate the effects of assistance reductions on national productivity.

Overall, the econometric study provides a useful indicator of the likely direction of productivity improvements arising from tariff reductions. The results from the econometric study were used to estimate the possible impact of removing tariffs on items under reference on the level of productivity in manufacturing industry in this study. To provide an indication of the sensitivity of the results to endogenous productivity growth, the impact of tariff reductions were also estimated without tariff-induced productivity improvements.

In commenting on the draft report, the AIG claimed that the results of the Chand study suffered from selection bias. This criticism would be valid if the Commission had claimed that 'cold shower' effects operated solely through increases in the productivity of ongoing firms in an industry. However, the Commission made no such claim, in either its workshop paper or in the draft report. Indeed, the detailed empirical evidence of researchers such as Baldwin (1995) shows that the entry and exit of firms has also been as important a driver of industry-level productivity growth, although its importance relative to the productivity performance of ongoing firms has varied over time.

D Quantifying labour market adjustment costs caused by tariff reductions

D.1 Introduction

This appendix describes how the labour market adjustment costs attributable to tariff reductions were estimated. Dixon, Parmenter and Rimmer (1997) developed the method.

Labour market adjustment costs are the costs associated with people changing their labour market status during the course of a year — that is, switching occupations and/or geographical regions of employment, becoming unemployed or finding a job, or entering or exiting the labour market.[1] Labour market adjustment costs include training and retraining costs, disruption to the efficiency of a workplace caused by a loss of experienced employees, and loss of labour output during periods in which an individual is unemployed.

D.2 Analytical issues in quantifying labour market adjustment costs

All economic change induces labour market adjustment costs. Even if no-one moved between jobs, there would still be initial vocational training costs associated with young workers entering employment for the first time. But ABS data (Cat. no. 6209.0) also suggest that 5 per cent of employed persons could change occupations or their region of employment each year. If the cost per person, in terms of workplace disruption or training/retraining, were 3 person-months labour, for example, then labour market adjustment costs each year would amount to 5 per cent of 3/12 person years for each employed person. That is, labour market adjustment costs would be equivalent to 1.25 per cent of total employment.

[1] The regions used in the current analysis are the 57 statistical divisions in the MONASH model.

This assessment considers only changes in jobs, not temporary unemployment during job search. This might be prevalent during significant structural change in the economy, especially if employment is declining for some activities and increasing for others. The cost of such unemployment is at least the value added by the unemployed if they had been employed. This may vary depending on the nature of the worker, but in this report the total person-years of lost labour time is used as the aggregate measure of labour market adjustment costs caused by unemployment. In chapter 1, this is converted to a dollar value based on average annual earnings.

Significant structural change is expected to occur in Australia over the next decade. The base case forecast of the MONASH model (Adams, Dixon, McDonald, Meagher and Rimmer 1999) shows that most structural change will be caused by economic factors other than government policies — factors such as population and labour force growth, changes in technical efficiency and terms of trade. These will be the main factors contributing to labour market adjustment costs.

The effect of a particular government policy (such as reducing tariffs) on adjustment costs may depend on the economic environment in which the policy is implemented. If the policy merely slows the rate of employment growth in some industries, while accelerating employment growth in other industries, it may have little effect on labour market adjustment costs. Total employment growth may continue at the same rate as before, and no actual movement of workers from one industry to another need occur to accommodate the slowed growth of some industries. By way of contrast, if some industries are initially contracting and the policy increases their rate of employment decline, then the consequent unemployment or redeployment of displaced workers may cause a significant increase in labour market adjustment costs.

Therefore, the labour market adjustment costs of any policy — for example, a tariff reduction — cannot be analysed in isolation from a reference case, the path through time of the economy in the absence of the policy. If a past policy is being assessed, then the appropriate reference case would be historical. If a possible future policy is being assessed, as in this report, the appropriate reference case is a projection of the future.

Since the tariffs under reference are small, it is likely that the labour market adjustment costs caused by any future reductions in these tariffs will be small compared with adjustment costs in the reference case. This is, in fact, confirmed by the results presented here and in chapter 1.

D.3 Quantification of adjustment costs

Overview

The total labour market adjustment cost for an economy is the sum of all the costs of individual changes in labour market status occurring within a year plus the cost of continuing unemployment. Consequently, to quantify the total labour market adjustment cost, it is necessary to know the number of such changes. It is also necessary to know the labour market states between which changes are being made. This is so because, for example, the adjustment cost of losing a job may differ from the cost of commencing a job after being unemployed. Consequently, to quantify the total labour market adjustment cost requires two pieces of information. First, it is necessary to know the gross flows of persons between labour market states. Second, it is necessary to know what is the cost per person of each type of change in labour market status.

The MONASH model provides a tops-down disaggregation of national *net* employment flows by industry to the State and Territory level. But neither gross flows nor the costs of each labour market transition is produced as an output of the MONASH model, nor contained within the MONASH model database. Consequently, the MONASH model cannot, in its current form, produce estimates of labour market adjustment costs.

Adjustment costs estimates can only be determined post-simulation, by using net labour market flows from MONASH, and then using additional information or assumptions to impute gross labour flows, and to impute costs to these gross labour market changes, in order to calculate total labour market adjustment costs. The measure of labour market adjustment costs thus derived is called the LILI (labour input loss index), and is formally described in Dixon, Parmenter and Rimmer (1997) (hereafter referred to as DPR). In a further tops-down calculation, it disaggregates the MONASH model's employment flows to a very detailed occupational level (340 occupations), imputes gross flows, and assigns costs to these flows.

Labour market adjustment costs are estimated for each year of both the base case forecast and the policy simulation. The net effect of the removal of tariffs under reference on labour market adjustment costs, for each year over which the dynamic simulations are performed, is the difference between the estimated labour market adjustment costs in the policy simulation and in the base case.

Terminology and scope of adjustment index

Before describing the additional data and assumptions required for the LILI, some clarification of terminology is required.

First, in the context of the calculation of the LILI, the labour force consists of all those people who are both willing and able to work. Therefore, it includes discouraged workers, who are classified as not in the labour force in official ABS statistics. The definition adopted in this report is more appropriate when measuring adjustment costs, since it is necessary to account for all potential labour effort that is not realised. This includes the contributions of discouraged workers, who would work if jobs were available.

Second, retirements from the labour force consist of all those withdrawing from the workforce for reasons other than the availability of jobs. It includes those reaching the compulsory retiring age, those unable to continue work because of ill-health, and those withdrawing to enjoy more leisure — that is, all those who are either unwilling or unable to work.

Third, the LILI is measured in terms of person-hours. However, to avoid cumbersome language, labour market changes will be described as, for example, 'persons changing jobs', not 'a certain number of person-hours being reallocated between jobs'.

Changes in labour market status — data and assumptions

The first stage in quantifying labour market adjustment costs is the imputation of gross labour flows from the MONASH model's net flows. This process uses both additional data and assumptions about the likelihood of particular changes.

Data

It is assumed that approximately 5 per cent of employed persons change occupations and/or their region of employment each year, based on labour mobility data in ABS Cat. No. 6209.0.[2]

It is assumed that 0.8 per cent of both employed and unemployed persons retire each year. This is based on how many young people and migrants were entering the

[2] A much higher percentage — for example, 14 per cent of those working during the year ending February 1998 — change employer and/or region, but only 34 per cent of these change occupation.

labour force per year and how the size of the labour force was changing each year (ABS Cat. No. 6203.0). The labour force data were smoothed to reduce the impact of employment-induced effects — such as the discouraged worker effect — on the work force (since the LILI definition of workforce includes discouraged workers, as noted previously). Then the number of retirements could be calculated.

The participation rate — the proportion of the working age population in the labour force — is 65 per cent, based on ABS data (Cat. no. 6202.0). While the ABS definition of the participation rate excludes discouraged workers, contrary to that used in the LILI framework, this is a piece of data to which results are particularly insensitive. Therefore, this inconsistency has little impact on the results.

Annual growth rates for employment by 340 occupations and 113 industries (used in the calculation of the number of switches between occupations — see below) are estimated from the ABS Labour Force Survey and Census data (Cat. Nos. 6203.0 and 2015.0). A description of the method used to estimate the growth rates is provided in Meagher (1997).

Assumptions

A judgement is made regarding the proportion of persons not in the labour force who enter it each year, but remain unemployed at the end of the year. This proportion is set at a low value of 1 per cent, reflecting a judgement that such a change is not very likely. Given the LILI definition of not in the labour force — that is, unwilling or unable to work — it seems unlikely that an individual thus inclined at one time would enter the labour force without a definite prospect of employment. Recall that discouraged workers are, under the LILI definition, already counted as in the labour force. The chief shortcoming of this assumption is that it ignores one significant source of shifts into the labour force as an unemployed person — youth reaching working age and being unable to find employment. But this is a limitation only if it is considered that the policy under evaluation will make significant changes to youth unemployment.

Another assumption is that, of the job vacancies arising in any year, 75 per cent are filled by the unemployed, and 25 per cent by those not in the labour force immediately prior to their employment. It is very difficult to assess the ability of the unemployed, as a whole, to find employment relative to those not in the labour force, and hence to impute the proportions of job vacancies filled by each group. Unemployed persons are a non-homogeneous group. For example, some will be skilled, short-term unemployed who can readily fill the available positions. Some, however, will be long-term unemployed, possibly with low skill levels, and whose very length of unemployment may serve as a negative signal to prospective

employers. The proportions currently used would be reasonable, for example, if there were more skilled individuals in transit between jobs (and hence temporarily unemployed) than there were skilled individuals (such as tertiary graduates) entering the labour force.

Disaggregation across occupations and regions

Although the aggregate proportion of job/region switches is tied to ABS labour mobility data, some judgements are required for disaggregating these into shifts between particular occupations and regions. In particular, a judgement concerning the ease of changing occupations and regions must be made. The assumption for regions is that changing to a different occupation is twice as likely if the new job is located in the same region. To represent the relative ease of changing occupations, similarity weights of 1, 0.5 and 0.1 are assigned to pairs of occupations. These are the factors by which the likelihood of the occupational change is scaled if the occupations are very similar, slightly similar, or quite dissimilar, respectively. The degree of similarity between occupations is assessed based on the qualifications required for each occupation: specialist university; general university; trade qualification; and non-skilled. For example, switches to occupations requiring a specialist university qualification, such as brain surgeon, were made difficult, and switches from occupations requiring specialist or general university qualifications to occupations requiring a general university qualification were made easy.

The aggregate proportion of job/region switches is disaggregated to switches between 340 occupations in each region. The disaggregation proceeds as follows. Occupation/industry-specific employment growth rates (Meagher 1997) are scaled to agree with industry-specific employment growth from the MONASH results for which the LILI is being calculated. The regional distribution of employment, again from the MONASH database and model output, is used with the employment growth rates to calculate the net growth in employment by occupation and region. The number of people moving from one occupation/region to another is proportional to the size of employment in the original occupation/region and the growth in employment in the destination occupation/region. It is also proportional to the 'similarity' between occupations and regions, as quantified in the assumptions described above.

Costs of changes in labour market status

The second stage in quantifying labour market adjustment costs is assigning a cost per person to each type of change in labour market status. Table D.1 summarises the

assumptions about labour market adjustment costs for each type of change in labour market status.

Table D.1 **Costs of changes in labour market status**
(person-years per person)

	Employed next year		*Unemployed next year*	*Not in labour force next year*
	Same category[a]	*Other category*		
Employed this year	0.0	0.25	0.5	0.0
Unemployed this year	0.75		1.0	0.5
Not in labour force this year	0.25		0.5	0.0

[a] Category means a particular occupation in a particular region.

Source: Dixon, Parmenter and Rimmer (1997).

Costs are assigned based on judgement, but for some changes the nature of the costs is such that a high degree of confidence can be placed in the judgement made. These are the cases where the cost is labour output lost because of time spent unemployed. For someone who remains unemployed for the entire year, the cost is 1 person year.[3] For someone becoming unemployed after being employed or not in the labour force, the cost is the proportion of the year for which they are unemployed. If these changes are spread evenly across the year, the cost on average will be 6 person months. For someone leaving the labour force after being unemployed, the cost will likewise be 6 person months, that being the average amount of time for which such an individual was unemployed. Once out of the labour force, their time does not count as lost labour.

This cost of 6 person months serves as a useful reference point in assigning costs that are more uncertain. For someone entering a job after being unemployed or from outside the labour force, or for someone changing jobs, a training/retraining or workplace disruption cost of 3 person months is assumed — half of the 'average period unemployed' cost of 6 person months. Arguably, this cost should vary depending on whether occupational change has occurred, and depending on whether the individual was previously unemployed or out of the labour force, which may tend to be correlated with low skill levels. Nevertheless, a non-trivial cost bounded above by 6 person months seems reasonable.

[3] In the present implementation of LILI, it is assumed that the psychological and social costs of unemployment are zero. This could be amended in future implementations of the LILI.

For a person finding a job after being unemployed, the adjustment cost is 9 person months — 6 person months associated with the average period of unemployment, plus 3 person months associated with starting a new job.

It is assumed that there is no labour market adjustment cost associated with those individuals remaining in the same occupation in the same region. However, in the current implementation of LILI, the regions are defined to be the 57 statistical divisions, many of which are reasonably small.

D.4 The factors contributing to labour market adjustment costs

The labour market adjustment costs in the base case and with the removal of all tariffs under reference are shown in tables D.2 and D.3. The chief interest in analysing the labour market adjustment costs of the removal of tariffs under reference is the comparison of costs between the base case and the policy simulation. These differences are shown in table D.4. Table D.2 will be described briefly to illustrate the decomposition of labour market adjustment costs into different effects, and to spell out the assumptions underlying the application of the LILI in this report.

Table D.2 **Labour market adjustment costs in the base case**
(costs are a percentage of the current period labour force)

	Year 0	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Total labour market adjustment cost	7.91	7.91	7.89	7.89	7.89	7.89
Swap effect	0.45	0.45	0.43	0.43	0.43	0.43
Macro effect	7.47	7.47	7.47	7.47	7.47	7.47
Involuntary unemployment effect	7.00	7.00	7.00	7.00	7.00	7.00
Transitional unemployment effect	0.06	0.06	0.06	0.06	0.06	0.06
Employment effect	0.40	0.40	0.40	0.40	0.40	0.40

Source: PC estimates based on MONASH dynamic simulation and the LILI programs supplied by CoPS.

The labour market adjustment costs can be decomposed into various effects. In DPR, the LILI was decomposed into two effects — the macro effect and the swap effect. The macro effect captures the impact on labour market adjustment costs of changes in aggregate employment and unemployment, including transitional unemployment. The swap effect is the contribution to labour market adjustment costs 'of training costs associated with people moving between employment categories, and with matched moves into and out of employment' (DPR). As in

DPR, it is found that, in the base case, the swap effect is very small compared with the macro effect.

The macro effect can be further decomposed into an employment and an average unemployment effect. The employment effect is the training costs caused by changes in aggregate employment over time. The average unemployment effect is a combination of the effect of underlying involuntary unemployment and the transitional unemployment caused by the changing structure of the economy. For the base case, the decomposition of the macro effect into an involuntary unemployment effect, a transitional unemployment effect and an employment effect is shown in the last three rows of table D.2.

It is assumed (within MONASH) that the rate of involuntary unemployment is fixed over time in the base case. The effect of the assumed rate of 7 per cent (within the LILI calculation) can be seen in row four of table D.2. The constancy of the rate reflects the projection into the future of a slightly more pessimistic situation than at present, so as not to underestimate labour market adjustment costs.

Similarly, it is assumed that the growth rate of the labour force is the same in the base case and under the removal of tariffs under reference. The equality between the rate used in the base case and that used in the policy simulation is consistent with the assumption that the magnitude of the economic changes brought about by tariff removal is not large enough to affect, in the short to medium term, the participation rate or population growth rate. Given that both of these variables are fairly unresponsive to economic factors, these assumptions seem very reasonable.

In the base case, swap effects, transitional unemployment effects and employment effects add to labour market adjustment costs of a magnitude equivalent to almost 1 per cent of the labour force.

Table D.3 shows the labour market adjustment costs under the removal of tariffs under reference. It is assumed (within MONASH) that aggregate employment is the same as in the base case. This reflects a more conservative approach to the possible adjustment costs of tariff removal than in DPR, where aggregate employment increased in the short term. It also reflects the belief that, in the long run, the removal of tariffs will neither increase nor decrease the underlying unemployment rate relative to what it otherwise would have been.

Table D.3 **Labour market adjustment costs with removal of tariffs under reference plus economic growth**

(costs are a percentage of the current period labour force)

	Year 0	*Year 1*[a]	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Total labour market adjustment cost	7.91	7.92	7.93	7.92	7.92	7.92
Swap effect	0.45	0.45	0.43	0.43	0.43	0.43
Macro effect	7.47	7.47	7.50	7.49	7.49	7.49
Involuntary unemployment effect	7.00	7.00	7.03	7.03	7.03	7.03
Transitional unemployment effect	0.06	0.08	0.06	0.06	0.06	0.06
Employment effect	0.40	0.40	0.41	0.40	0.40	0.40

[a] The tariffs are removed in this year.

Source: PC estimates based on MONASH dynamic simulation and the LILI programs supplied by CoPS.

However, MONASH does not model gross flows between labour market states, so it cannot estimate the labour market adjustment costs associated with these transitions. In particular, it cannot provide estimates of any increases in transitional unemployment. Consequently, part of what is counted in MONASH as aggregate employment is not, in fact, contributing to the output of the economy, but is taken up in labour market adjustment costs. Part of these costs is the time spent unemployed by labour in transition, and part is training and retraining. MONASH therefore overestimates both aggregate employment and the productivity of labour.

The LILI procedure provides an estimate of the size of the labour market adjustment costs that MONASH counts as part of aggregate employment. Thus there is an unavoidable inconsistency between the LILI results and the MONASH assumption of the same aggregate employment between corresponding years of the base case and the policy simulation. The source of the inconsistency can be summarised as follows: MONASH assumes no labour market adjustment costs (as it lacks the structure for modelling gross labour market flows), whereas the LILI attempts to impute some based on the MONASH results. For example, the LILI procedure shows that the total unemployment (involuntary plus transitional) rate rises by 0.017 percentage points (relative to the base case) in the year of tariff removal (table D.4). This difference increases to 0.031 percentage points a year later, before slowly decaying to zero over time.

The additional labour market adjustment costs that arise from the removal of tariffs, and their decomposition into contributing effects, are shown in table D.4.

Table D.4 **The net effects of the removal of tariffs under reference on labour market adjustment costs, short-run effects**

(costs are a percentage of the current period labour force)

	Year 0	*Year 1*[a]	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Total labour market adjustment cost	0.000	0.008	0.032	0.027	0.026	0.025
Swap effect	0.000	-0.001	0.000	0.000	0.000	0.000
Macro effect	0.000	0.008	0.032	0.028	0.026	0.025
Involuntary unemployment effect	0.000	0.000	0.033	0.028	0.027	0.025
Transitional unemployment effect	0.000	0.017	-0.002	0.000	0.000	0.000
Employment effect	0.000	-0.008	0.001	0.000	0.000	0.000

[a] The tariffs are removed in this year.

Source: PC estimates based on MONASH dynamic simulation and the LILI programs supplied by CoPS.

In the year of the tariff reduction, the largest contribution to labour market adjustment costs is from transitional unemployment. Note that this effect is always (not just in the first year) of the opposite sign but double the magnitude of the employment effect. The transitional unemployment effect measures the loss from workers being temporarily unemployed during the current year while seeking a job, and the cost of a person being unemployed for part of the year is assumed to be 6 person-months (as explained above). The employment effect equals the cost of training arising from aggregate employment growth, and the cost of training per person is 3 person-months (as also explained above). The relative magnitudes of the transitional unemployment and employment effects are explained by the relative magnitudes of the costs per person, while the offsetting signs reflect the shift of some extra people from employment to transitional unemployment under the tariff removal.

In the year of the tariff reduction, the swap effect makes its only significant contribution. It is retraining costs arising from job switching. In the first year the decline in employment decreases the prevalence of job switches, and so the contribution of the swap effect to labour market adjustment costs is negative.

In the year of the tariff reduction, any increase in unemployment, relative to the base case, is counted as transitional. Because the higher number of workers seeking employment cannot all be matched to jobs in the first year, some find themselves without a job for more than a year. This leads to an increase in involuntary unemployment in the second and subsequent years. Indeed, it is this increase in involuntary unemployment, relative to the base case, which is, essentially, the labour market adjustment cost for each year after the first.

Table D.5 **The net effects of the removal of concessional tariffs under reference on labour market adjustment costs, short-run effects**
(costs are a percentage of the current period labour force)

	Year 0	*Year 1*[a]	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Total labour market adjustment cost	0.000	0.001	0.005	0.004	0.004	0.004
Swap effect	0.000	0.000	0.000	0.000	0.000	0.000
Macro effect	0.000	0.001	0.005	0.004	0.004	0.004
Involuntary unemployment effect	0.000	0.000	0.005	0.004	0.004	0.004
Transitional unemployment effect	0.000	0.003	0.000	0.000	0.000	0.000
Employment effect	0.000	-0.001	0.000	0.000	0.000	0.000

[a] The tariffs are removed in this year.

Source: PC estimates based on MONASH dynamic simulation and the LILI programs supplied by CoPS.

The additional labour market adjustment costs that arise from removing only the concessional tariffs under reference are shown in table D.5. The pattern of adjustment is similar to the case when all tariffs under reference are removed (table D.4). The adjustment costs in each of these policy experiments are of a similar magnitude *relative to* the macroeconomic effects, though the adjustment costs are obviously smaller in absolute terms when only concessional tariffs are removed.

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