STRUCTURAL EFFECTS OF INCREASING AUSTRALIA'S IMPORTS FROM LESS DEVELOPED COUNTRIES

Peter G. Warr

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Abstract

The trade-off between two effects of reduced Australian protection is studied in this paper. These are, on the one hand, the desired effect of increasing imports from less developed countries (LDCs), and on the other, the politically undesired structural effects of reduced protection, primarily involving reductions in the share of the manufacturing sector in national output and employment. The paper focuses on the decade 1968-69 to 1977-78 and the analysis utilizes the ORANI general equilibrium model of the Australian economy in conjunction with the Australian trade data. It is argued that over this decade Australian protection came to discriminate much more heavily against the LDCs, relative to Australia's other trading partners. Nevertheless, reductions in rates of protection at the individual commodity level have widely varying effects on Australia's total imports from LDCs. These effects are in fact negative in around one fourth of the cases.

Of 62 commodities subject to positive rates of protection, a given proportional reduction in the rates of protection of only eight would have a greater effect on imports from the LDCs than that same proportional reduction applied to all 62 rates. Reduced protection of these eight commodities would in addition have much smaller structural effects than an equal across-the-board reduction. Moreover, virtually any undesired structural effect of reduced protection of these eight items could be counteracted by increased protection of one or more of the commodities for which an increase would benefit the LDCs.
STRUCTURAL EFFECTS OF INCREASING AUSTRALIA'S IMPORTS
FROM LESS DEVELOPED COUNTRIES

Peter G. Warr
Australian National University

I Introduction

By OECD standards, Australia is a highly protectionist country. The relationship between this protection and the export prospects of the less developed countries (LDCs) has been the subject of extensive popular and professional debate in Australia, from two quite different directions. First, there has been growing recognition that Australia's heavy protection of its manufacturing sector adversely affects the export prospects of the LDCs. This recognition has in part reflected a sympathetic response to demands from representatives of the LDCs for greater access to the markets of the more developed countries (MDCs) for LDC exports, and has in part been a by-product of the growing political importance to Australia of the developing countries of East and Southeast Asia. Reductions in Australian protection have thus been advocated partly for this reason.

Second, and from a quite different direction, there has been a popular fear that a "flood of imports from cheap-labour countries" may result from continued improvements in the export competitiveness of the LDCs, particularly in manufacturing, or from reduced protection within Australia. It is believed that this would cause increased unemployment within Australia and would affect the structure of the Australian economy in ways that are not desired. Fears of this kind are not unique to Australia, and there is nothing new about them.
They derive emotional support from Australia's historical fear of the densely-populated countries of Asia and indeed continued public tolerance of the heavy protection of Australia's manufacturing sector testifies in part to their historical persuasiveness. It also testifies to the political attractiveness of protectionist arguments which assume the desirability of maintaining a substantial manufacturing sector within the Australian economy.

This paper attempts to examine these two aspects of the debate together. First, Section II discusses the effects that Australian protection has on its imports from LDCs. Both the overall effects of Australia's system of protection and the effects of the protection of particular industries are examined. Next, Section III looks at the structural effects of reduced protection. Although the undesired structural effects of reduced protection are usually not well defined, reductions in the share of the manufacturing sector in national output and employment appear to be of central concern. This paper focuses on the effects of reduced protection of those commodities where such reductions would be of most benefit to the LDCs.3

II Australia's Imports from LDCs and the Effects of Reduced Protection

Australia's imports from LDCs in recent years as a proportion of its total imports are summarised in Table 1.4 This proportion rose from around 15 per cent in the early 1960s to around 20 per cent in the late 1970s. The LDCs' share of world exports of all commodities was consistently somewhat greater than this. For example, this share was 19 per cent in 1968 and 26 per cent in 1977.5 In the case of
<table>
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Table 1.

*Source: Industry Assistance Commission.*
manufactured commodities, this situation is reversed, with Australia's imports from LDCs rising over the period 1968-69 to 1977-78 from 7 to 13 per cent of its total imports of these commodities, whereas the LDCs' share of world exports of manufactures rose from 5 to 8 per cent over this period.

Australia's trade policies affect its imports from the LDCs in two ways. Direct discrimination between trading partners operates through Australia's system of trade preferences. The countries receiving these preferences include both MDCs and LDCs. Since the United Kingdom joined the EEC in 1973, the balance of these preferences has shifted in favour of the LDCs, but their commodity coverage remains very limited. Indirect discrimination is much more important. It occurs as a result of Australia's uneven system of industrial protection. Obviously, this protection is intended to assist particular Australian industries. Its differential effects on Australia's trading partners are an unintended but nevertheless significant side-effect.

In an earlier paper (Warr and Lloyd, 1982), it was shown that the effect of Australia's trade preferences on its imports from the LDCs is far less important than even quite small changes in overall rates of protection. As a means of increasing Australia's imports from the LDCs, changes in overall rates of protection are of much greater importance than changes to Australia's system of trade preferences would be likely to be. Consequently, this paper focuses on the effects of Australia's protection (indirect discrimination) on its imports from the LDCs.
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Source: Calculated from data provided by the Australian Institute of Health and Welfare.
Obviously, the high but variable rates of protection seen in Australia have differential effects on its various trading partners. One way to show this would be to construct weighted averages of the nominal rates of protection applying to various commodities, with the commodity weights used for each trading partner reflecting the share of the commodity concerned in Australia's total imports from that country. The well-known difficulty with this procedure is that actual import shares reflect existing rates of protection. Commodities subject to high rates of protection consequently receive too low a weight. Nevertheless, while free trade import shares would be preferable for this purpose, they are unobserved. Actual import shares have therefore been used in the construction of Table 2. It is not clear that any systematic bias between trading partners would be likely to result from this procedure. These calculations suggest that Australian protection was slightly heavier against commodities exported by MDCs than those exported by LDCs throughout the period 1968-69 to 1980-81 but that the difference between them diminished over time.6

The impact of a country's protection on its imports from particular trading partners depends not only on the rates of protection it applies to the commodities exported by those trading partners, but also on the degree to which its imports of those commodities respond to changes in rates of protection. This depends on domestic supply and demand conditions. Countries exporting commodities which have highly elastic import demand within Australia could be more adversely affected by Australian protection than others which export commodities subject to higher rates of protection but for which Australia's import demand is less elastic. Differences among
countries in this respect are missed by the sort of analysis presented in Table 2, but these differences are clearly central to an assessment of the degree to which imports from particular groups of countries would respond to reduced Australian protection.

This issue is studied in this paper with the aid of a multi-sectoral general equilibrium model of the Australian economy. This 109 sector model, known as the ORANI model, is discussed in detail in Dixon, et al. (1977 and 1982). It belongs to the general class of Johansen multi-sectoral models and is linear in the percentage response of endogenous variables to given percentage shocks in exogenous variables. For a given specification of endogenous and exogenous variables, the model thus computes a matrix of elasticities giving the response of the former to variations in the latter. The ORANI model has now been widely applied in policy-related economic research within Australia and its structure is particularly well suited to the analysis of the general equilibrium effects of changes in protection.

Two variants of the ORANI model are used. These are referred to as the 1968-69 and 1977-78 variants, and are respectively based on the 1968-69 and 1974-75 Australian input-output tables, 1968-69 and 1977-78 import shares, and 1968-69 and 1977-78 data on tariff equivalent rates of protection by input-output commodity. In other respects, such as in the econometric estimates of domestic consumer demand elasticities, export demand elasticities and other parameters which underly the model, the two variants are the same. In both variants, real aggregate absorption (consumer spending plus investment plus government spending, all in real terms) is held constant, and in
both variants real wages are held fixed and labor markets are therefore slack. All imported commodities are assumed to be available in infinitely elastic supply.

In this exercise, the ORANI model is used in conjunction with the Australian trade data to estimate the effects of reduced Australian protection on its imports from various trading partners. The assumption is made that for each commodity the proportion of Australia's imports coming from any one country is unaffected by changes in levels of protection. Changes in protection will thus affect individual countries' exports to Australia in different proportions provided the proportional response of Australia's imports to a change in protection differs from one commodity to the other.

The simulated effects that reduced protection has on imports from LDCs are summarised in two ways. First, the dollar value of the increased imports from particular groups of countries that would result from a thirty per cent reduction in all rates of protection is estimated. Second, the discriminatory impact of a uniform reduction in protection is captured by computing for each group of countries an index of discrimination. This consists of a ratio of that group of countries' marginal share to its average share. The marginal share is that group of countries' share of the increased volume of imports which enter Australia in response to the uniform reduction in protection. The average share is simply Australia's total imports from that country or group of countries as a share of Australia's total imports.
The index of discrimination can be represented most clearly in terms of elasticities. For country group $k$, the index is given by

$$I_k = \frac{\eta_{kt}}{\eta_{t}}$$  (1)

where $\eta_{kt}$ denotes Australia's elasticity of demand for imports from country $k$ with respect to the rate of protection, $t$ (in general, changes in $t$ can represent across the board changes in protection or, in other applications, changes in individual rates), and $\eta_{t}$ denotes the elasticity of demand for imports from all countries with respect to the rate of protection.

Alternatively, writing $M_{ik}$ for imports of commodity $i$ from country $k$, and $dM_{ik}$ for the change in that variable resulting from a given change in protection,

$$I_k = \frac{n \sum_{i=1}^{n} \sum_{k=1}^{m} \frac{dM_{ik}}{M_{ik}}}{n \sum_{i=1}^{n} \sum_{k=1}^{m} \frac{M_{ik}}{M_{ik}}}$$  (2)

where $n$ and $m$ denote the number of commodities and the number of countries supplying imports, respectively. This expression is estimated by means of the maintained assumption that $dM_{ik}/dM_{i} = M_{ik}/M_{i} \equiv \alpha_{ik}$, where $M_{i} \equiv \sum_{k=1}^{m} M_{ik}$ denotes total imports of commodity $i$. That is, $dM_{ik} = \alpha_{ik} dM_{i}$, and the estimated value of $I_k$ is thus

$$I_k = \frac{n \sum_{i=1}^{n} \alpha_{ik} dM_{i}}{n \sum_{i=1}^{n} dM_{i}}$$  (3)
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<td>1985-86</td>
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**Table 1.**

Average Area, Imports from India and Effects of a General Cut in Protection
Clearly, a country or group of countries for which the index of discrimination exceeds unity is one whose share of Australia’s imports would rise if Australia’s protection was reduced, while a country for which the index is less than unity is one whose share of Australia’s imports would fall. The higher the index of discrimination, the more heavily Australia’s protection discriminates against imports from that country vis-a-vis others. Obviously, the weighted average of all indices of discrimination across trading partners is unity. Therefore, a country whose index is greater (less) than unity is one against which Australia’s protection discriminates more (less) heavily than against the average of all other countries.

The results of this exercise are summarised in Tables 3 and 4. Table 3 relates to uniform across-the-board reductions in protection. Table 4 presents the effects on imports of all commodities of reductions in the protection of individual manufactured commodities, holding all other rates constant. The results of this exercise are presented for each of two years, 1968-69 and 1977-78. The 1968-69 and 1977-78 results use the 1968-69 and 1977-78 variants of the ORANI model in conjunction with the Australian trade data corresponding to 1968-69 and 1977-78, respectively. These years are chosen because readily available variants of the ORANI model exist for these years and because the period 1968-69 to 1977-78 captures important changes in Australian protection policy. In particular, both the textile, clothing and footwear commodity group and the transport equipment commodity group, which includes motor vehicles, became more heavily protected over this period, while protection was lowered in other areas.
The results in Table 3 indicate that a 30 per cent reduction in all rates of protection would have caused imports from the LDCs as a whole to rise by 1.6 per cent in 1968-69 and 2.6 per cent in 1977-78. These seem surprisingly low, considering the amount of concern this issue has generated in Australia. On the other hand, a similar qualitative conclusion also holds for imports from the NICs.\textsuperscript{11} The results for the index of discrimination are more revealing. The index of discrimination against LDC imports rose significantly over this period from well below unity to just above unity. Over this period, the incidence of Australia's system of protection shifted heavily against the interests of the LDCs relative to the more advanced countries.\textsuperscript{12} Within the LDCs, this same qualitative statement applies to the ASEAN countries and to other low income LDCs, particularly China and India.\textsuperscript{13} The index of discrimination rose slightly for middle income LDCs and fell marginally for the newly industrializing countries, but from a high level.

There are two possible explanations for this change in the incidence of Australian protection. First, it could be due to changes in the structure of the Australian system of protection, discriminating in recent years more heavily than before against commodities which happen to be exported by the LDCs. Second, it could be due to changes in the comparative advantage of the LDCs, whose exports now consist to a greater extent than before of commodities which have always been subject to high rates of protection in Australia. Of course, these explanations are not mutually exclusive. Their relative importance has been examined by means of the following experiment. First, the 1968-69 variant of the simulation model was combined with the 1977-78 trade data. The index of discrimination for
the LDCs was then 0.916. Reversing this, and combining the 1977-78 variant of the model with the 1968-69 trade data, this index becomes 0.638.

Clearly, the second of the two possible explanations is the more important. It is primarily changes in the types of commodities Australia imports from the LDCs (as captured in the trade data), rather than changes in the structure of Australian protection (as captured in the simulation model), which accounts for the fact that Australian protection has come to discriminate more heavily against imports from the LDCs as a group. Of course, this shift in the composition of Australia's imports from the LDCs, towards commodities which are highly responsive to reduced protection, reflects a shift in the comparative advantage of the LDCs, towards commodities against which Australia maintains high rates of protection.

It is useful to examine the effects of reduced protection at a more disaggregated level. Of the 109 commodities specified in the Australian input-output tables, 80 are traded goods and 29 are non-traded. Of the traded goods, positive rates of nominal protection have been estimated for 62 items, most of which are manufactured commodities. The ORANI model is capable of estimating the effects of reduced protection on each of the individual items separately, holding the others constant, as well as the effects of reducing all, or groups of items, simultaneously. The results presented relate to the general equilibrium effect that reductions in the rates of protection of individual commodities have on Australia's total imports of all commodities from the LDCs. The effect on imports from the LDCs of reducing protection on individual commodities varies widely. Even the
signs of these effects vary. Reduced protection of many items actually causes total imports from the LDCs to decline. This is true for 15 of the 62 tariff items in 1977-78 and for 17 items in 1968-69.

This variation in the response of imports from LDCs to reduced protection at an individual commodity level is illustrated in Table 4. The effects of reduced protection on each of the 62 tariff items have been estimated and, of these, ten commodities have been selected for inclusion in the table and for the analysis in the following section. These items were selected on the basis of the index of discrimination for the LDCs. The first eight commodities are ones for which reductions in their rates of protection cause increased imports from the LDCs, while the other two commodities are selected to illustrate the opposite possibility. The first eight commodities had the highest indices of discrimination against the LDCs in 1977-78 and are arranged in order of their indices of discrimination in that year. Reduced protection of these eight items together represents 107 per cent of the value of an equal percentage reduction in the rates of protection of all manufactured commodities in 1977-78 and 91 per cent in 1968-69. The increase over the decade in the LDCs' share of Australia's imports of these commodities is especially notable.

The other two commodities included in the table (9, man-made fibres and 10, motor vehicles and parts) are selected to illustrate the fact that reduced MFN protection of some commodities will actually reduce imports from the LDCs. To understand this, it is necessary to note first that only a very small proportion of Australia's imports of these two items comes from the LDCs. Consider man-made fibres first. Two mechanisms are operating. First man-made fibres are a substitute
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<th>Commodity (Input-Output Number)</th>
<th>LDC Share of Imports (%)</th>
<th>Nominal Rate of Protection (%)</th>
<th>Increase in Total Imports from a 30% General Cut in Protection</th>
<th>Index of Discrimination For LDCs</th>
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</thead>
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<td>8. Margarine, oils, fats (21.04)</td>
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</table>

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10)
for cotton and silk-based textiles, the latter imported heavily from LDCs. Reduced protection of man-made fibres thus stimulates their use as an intermediate good and demand for imports of natural fibre-based textiles declines. Because of the Leontief input-output assumptions used in the simulation model, this effect is muted within the analysis, and operates only through adjustments in industry outputs. The more important mechanism is that reduced protection of man-made fibres improves the competitiveness of the domestic clothing industry, causing imports of finished clothing items from the LDCs to decline as well.

The mechanism of adjustment is less direct in the case of motor vehicles. Reduced protection of automobiles stimulates production generally in the remainder of the manufacturing sector. The primary reason for this derives from the fixed real wage assumption. The price of motor vehicles is a major component of the consumer price index (CPI). Reduced motor vehicle protection lowers this price component of the CPI and the money wage corresponding to a fixed real wage thus falls in terms of the domestic prices of other manufactured goods. A lesser reason is that transport equipment is itself an input into the production of many other manufactured commodities. For both these reasons, reduced protection of motor vehicles improves the competitiveness of other import-competing manufacturing industries and thus causes imports of these commodities to decline, harming the LDCs.

It would seem that the share of LDCs in the change in total imports (of all commodities) which results from a reduction in the rate of protection of a particular commodity (the LDCs' marginal share for that tariff item) would be positively related to the share
of LDCs in Australia’s actual imports of that commodity. But how well
does information on the latter serve as a predictor of the former?
The answer is, not especially well. The correlation coefficient
between these two variables across all tariff items has been computed
and results of 0.50 for 1968-69 and 0.65 for 1977-78 were obtained.
These correlation coefficients are both significantly greater than
zero at the five per cent significance level, but the difference
between them and unity suggests that other factors are also important.
In particular, differences between commodities in the responsiveness
of imports to reductions in their own rates of protection (own price
elasticity of import demand) and differences in the cross-elasticity
of import demand clearly play an important role.

III Structural Effects

The effects that reduced protection has on employment and on the
structure of the Australian economy will now be considered. It is
important to recall that in the version of the ORANI model being used,
labour markets are slack and real wages are held fixed. Attention
will be focused on the effects on Australian output and employment of
reduced protection of the ten commodities included in Table 4, and
these effects will be compared with the effects of reduced protection
on imports from LDCs. The aim is to show the trade-off between the
(politically undesired) structural effects of reduced protection and
the (allegedly desired) effect on imports from LDCs.
A. Output Effects

We summarise the output effects of reduced protection of the ten selected industries by concentrating on the sectoral distribution of the change in the value of output at producer prices. First, we look at the change in the value of output in the industry in which protection is being reduced, followed by the change in the value of output in the manufacturing sector as a whole. The rest of the economy is then divided into two sectors, referred to as "the primary sector", comprising the agricultural and mining industries and "the non-traded sector", comprising the service industries, utilities and construction. To show the trade-offs involved, the dollar value of the output effects at producer prices are presented in Table 5 relative to the dollar value of the change in imports from LDCs at c.i.f. prices.

For example, in the case of commodity 1 in Table 5, knitted goods, the amount by which reduced protection causes imports from LDCs to rise in relation to its structural effects rose dramatically over the period 1968-69 to 1977-78. In the latter year, reduced protection of this industry causes output to decline by 1.3 dollars per dollar of increased imports from LDCs, but output rises in other industries. Surprisingly, most of this rise in output occurs within the manufacturing sector itself. Output of other manufacturing industries rises by 80 cents per dollar of additional LDC imports, giving a net decline of manufacturing output of 50 cents. Output in the primary sector and in the non-traded sector rises by 20 cents and 10 cents per dollar of additional LDC imports, respectively. Aggregate output declines by 15 cents per dollar of additional LDC imports. It must be
stressed that these output effects are calculated at domestic producer prices and that these prices are distorted by trade interventions such as tariffs and import quotas, by excise taxes, and by wage controls. Consequently, the sign of aggregate output effects does not necessarily have any welfare significance.

This general pattern is seen in each of the first eight commodities presented in the table. The trade-off between the structural effects of reduced protection and the effect on imports from LDCs appears to have improved substantially over the decade in the case of each of these commodities. Focusing on the results for 1977-78, output declines in the industry in which protection is reduced, but rises in the rest of the economy, taken together. In all cases, the major part of this rise in output in the rest of the economy occurs elsewhere in the manufacturing sector itself, and not in the primary or non-traded sectors, as might have been expected.\(^{15}\) This is an interesting result and occurs primarily because of the fixed real wage assumption, as outlined earlier. Reduced protection of one manufactured commodity lowers wage costs in other manufacturing industries, via its effects on the consumer price index. In the case of two commodities (7 and 8), aggregate output in the manufacturing sector actually rises.\(^ {16}\)

An equiproportional reduction in the protection of these eight commodities together accounts in 1977-78 for more additional imports from the LDCs than an across-the-board reduction of the same proportion; but it causes only 21 per cent of the decline in total output in the manufacturing sector that results from an across-the-board cut of the same proportion. Moreover, if protection
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Knitted Goods</td>
<td>-16.8</td>
<td>-16.7</td>
<td>3.0</td>
<td>0.9</td>
</tr>
<tr>
<td>2. Plywood</td>
<td>-3.9</td>
<td>-2.8</td>
<td>0.6</td>
<td>-1.0</td>
</tr>
<tr>
<td>3. Fibreboard</td>
<td>-2.8</td>
<td>-3.5</td>
<td>0.6</td>
<td>-0.9</td>
</tr>
<tr>
<td>4. Joining and Wood Products</td>
<td>-10.1</td>
<td>-6.8</td>
<td>1.7</td>
<td>-1.5</td>
</tr>
<tr>
<td>5. Clothing</td>
<td>-8.2</td>
<td>-7.7</td>
<td>1.2</td>
<td>-0.1</td>
</tr>
<tr>
<td>6. Footwear</td>
<td>-14.7</td>
<td>-16.5</td>
<td>1.4</td>
<td>-2.5</td>
</tr>
<tr>
<td>7. Cotton, silk etc.</td>
<td>-17.4</td>
<td>-4.128</td>
<td>3.1</td>
<td>3.7</td>
</tr>
<tr>
<td>8. Margarine, oils, fats</td>
<td>-6.3</td>
<td>4.3</td>
<td>1.7</td>
<td>1.2</td>
</tr>
<tr>
<td>9. Man-made fibres</td>
<td>178.5</td>
<td>157.2</td>
<td>-1.43</td>
<td>0.3</td>
</tr>
<tr>
<td>10. Motor vehicles, parts</td>
<td>28.8</td>
<td>2.8</td>
<td>-5.4</td>
<td>-6.1</td>
</tr>
<tr>
<td>Commodities 1 to 8</td>
<td>-11.1</td>
<td>-7.5</td>
<td>1.7</td>
<td>0.3</td>
</tr>
<tr>
<td>Across-the-board</td>
<td>-</td>
<td>-14.7</td>
<td>5.0</td>
<td>1.9</td>
</tr>
</tbody>
</table>
of motor vehicles is increased slightly (by eight per cent) the effect on manufacturing output of a 30 per cent reduction in the protection of the other eight commodities is cancelled out. But, for the reasons explained earlier, both of these changes cause imports from the LDCs to rise. The combination of these two adjustments to protection leaves manufacturing output unchanged, but imports from the LDCs increase by 112 per cent of the increase resulting from a 30 per cent across-the-board cut in all rates of protection. 17 Needless to say, this is not the sort of policy that would be recommended if the objective was to improve economic welfare within Australia; but if the aim of policy was to increase imports from the LDCs without reducing the size of the manufacturing sector, this combination of adjustments could achieve it.

B. Employment Effects

Popular discussion of protection, in Australia and elsewhere, focuses on the effect that changes in protection may have on employment in the protected industries themselves. Economists have pointed out, with growing political success, that the protection of one industry reduces output and employment in others. The effect that reduced protection has on aggregate employment will thus be very different from its effect on employment in the protected industry. The Australian trade union movement has been especially resistant to this line of argument. One interpretation of this resistance is that protection is believed to discriminate in favour of employment of particular categories of labour — those represented by the trade unions — and that these workers would be especially disadvantaged by reduced protection. This section of the paper attempts to capture
these elements of the debate by estimating the effects of reduced protection on employment in the protected industry, on aggregate employment, on the sectoral distribution of employment, and finally on "blue collar" employment. 18

Table 6 summarises the estimated employment effects of reduced protection of these ten commodities, as well as the effects of an across-the-board cut. Employment effects are expressed as the change in the number of workers per million dollars of additional imports from LDCs resulting from a cut in protection. The comparison of employment effects for 1977-78 and 1968-69 is similar to the comparison of output effects for those years discussed above, so the discussion will be confined to the results for 1977-78. Column (1) indicates the effect of reduced protection of the industry concerned on employment in that industry, relative to the increase in LDC imports. Column (5) shows the change in aggregate employment and columns (2) to (4) show the sectoral distribution of this aggregate employment effect. Finally, column (6) shows the effect on blue collar employment.

The sectoral distribution of employment effects is qualitatively similar to the output effects discussed above. The effects on aggregate employment of reduced protection of the first eight commodities are small and vary considerably. These net aggregate employment effects are estimated by summing across the estimated sectoral employment effects, the signs of which vary. It should be emphasised that the small residual which is obtained magnifies errors in the estimated sectoral components. The resulting estimates of aggregate employment effects are consequently the least reliable of
<table>
<thead>
<tr>
<th>Commodity</th>
<th>Protected Industry</th>
<th>Manufacturing Sector</th>
<th>Primary Sector</th>
<th>Non-traded Sector</th>
<th>Aggregate</th>
<th>Blue Collar</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Plywood</td>
<td>-77</td>
<td>-37</td>
<td>19</td>
<td>-15</td>
<td>-33</td>
<td>-41</td>
</tr>
<tr>
<td>3. Fibreboard</td>
<td>-46</td>
<td>-30</td>
<td>123</td>
<td>2</td>
<td>91</td>
<td>-3</td>
</tr>
<tr>
<td>4. Joining and Wood Products</td>
<td>-88</td>
<td>-78</td>
<td>31</td>
<td>-16</td>
<td>-63</td>
<td>-51</td>
</tr>
<tr>
<td>5. Clothing</td>
<td>-182</td>
<td>-149</td>
<td>77</td>
<td>-3</td>
<td>-75</td>
<td>-69</td>
</tr>
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<td>6. Footwear</td>
<td>-212</td>
<td>-207</td>
<td>56</td>
<td>-18</td>
<td>-169</td>
<td>-146</td>
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<tr>
<td>7. Cotton, silk, etc.</td>
<td>-114</td>
<td>51</td>
<td>109</td>
<td>57</td>
<td>217</td>
<td>96</td>
</tr>
<tr>
<td>8. Margarine, oils, fats</td>
<td>-35</td>
<td>95</td>
<td>54</td>
<td>23</td>
<td>172</td>
<td>111</td>
</tr>
<tr>
<td>9. Man-made fibres</td>
<td>615</td>
<td>-580</td>
<td>-621</td>
<td>-423</td>
<td>-1,624</td>
<td>713</td>
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<tr>
<td>10. Motor vehicles, parts</td>
<td>2,467</td>
<td>1,883</td>
<td>-1,146</td>
<td>-58</td>
<td>379</td>
<td>1,364</td>
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<td>Commodity 1 to 8</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Across-the-board</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6. Employment Effects per Unit Change in LDC Imports from Reduced Protection, 1977-78
(number of workers per million dollars of LDC Imports)
the results presented in the table. But a comparison of the estimated aggregate employment effects with the estimated blue collar employment effects does lend moderate support to the notion that the employment effects of reduced protection are biased against the interests of blue collar workers. In the four cases where aggregate employment falls, most or all of this decline is experienced by blue collar workers, and blue collar employment declines in two cases where aggregate employment rises.

Comparing the effects of reduced protection on commodities 1 to 8 with the effects of an across-the-board reduction, the former is more cost effective (loss of employment per unit of LDC imports) in terms of manufacturing employment, less so in terms of aggregate employment (which rises in response to an across-the-board cut) and about equally as effective in relation to blue collar employment. Comparison of the last two rows of columns (5) and (6) suggests that the net employment effects of reduced protection of commodities 1 to 8 are indeed biased against the interests of blue collar workers vis-à-vis other workers, but less so than is the case with an across-the-board cut.

IV Summary and Conclusions

This paper studies the trade-off between two effects of reduced Australian protection. These are, on the one hand, the desired effect of increasing imports from less developed countries (LDCs), and on the other, the politically undesired structural effects of reduced protection. These undesired structural effects primarily involve reductions in the share of the manufacturing sector in national output and employment. The paper focuses on the decade 1968-69 to 1977-78
and the analysis utilizes the ORANI general equilibrium model of the Australian economy in conjunction with the Australian trade data.

It is argued that the effects of Australian protection came to discriminate much more heavily against the LDCs, relative to Australia's other trading partners, over this decade. Nevertheless, reductions in rates of protection at the individual commodity level have widely varying effects on Australia's total imports from LDCs. Reductions in some rates would increase imports from the LDCs quite considerably, while reductions in others would actually cause total imports from the LDCs to decline. Negative effects of this type seem paradoxical but they arise from the fact that reduced protection of one commodity can cause imports of other commodities to decline. Obviously, a general equilibrium analysis is essential if effects of this sort are to be detected. A partial equilibrium analysis will necessarily miss the fact that the LDCs have an interest (in the short run, at least) in increased developed country protection of some commodities.

Of the 62 input-output commodities subject to protection, a given proportional reduction in the rates of protection of only eight particular commodities would have a greater effect on imports from the LDCs than that same proportional reduction applied to all 62 rates. Reduced protection of these eight commodities would in addition have much smaller structural effects than an equal across-the-board reduction. Moreover, virtually any undesired structural effect of reduced protection of these eight items could be counteracted by increased protection of one or more of the commodities for which increased protection would benefit the LDCs. These adjustments to
protection would not necessarily improve economic welfare within Australia, but if the objective of policy was to increase Australia's imports from the LDCs without causing undesired structural effects, then adjustments of this kind could achieve it.
APPENDIX: Simulation Model and Trade Data

A. Simulations

The simulations are based on the ORANI 77 short-run general equilibrium model of the Australian economy described in detail in Dixon, et. al. (1977 and 1982).

(1) Model closure

The balance of trade is determined endogenously within the model and aggregate real absorption, consisting of aggregate private investment, real household expenditure, and government expenditure, is fixed exogenously. Real wages are fixed exogenously and real output is determined endogenously.

(11) Data base

Two data bases are used in the calculations presented in the text. The results presented for the years 1968-69 and 1977-78 utilize the 1968-69 and 1977-78 variants of the model respectively. The 1968-69 variant is essentially the same as the model described in Dixon et. al. (1977), while the 1977-78 variant has only recently become available. The most important differences are summarised in Table A.1.

Table A.2 summarises the macroeconomic effects of a 30 per cent reduction in all rates of protection. All imports are assumed in the simulations to be available in infinitely elastic supply. It should be noted that the linearity of the model implies that the estimated effects of a 30 per cent change in any exogenous variable are simply three times the effects of a 10 per cent change, etc. It should also be noted that "protection" is represented in the model by the tariff
equivalent of the estimated nominal rates of assistance (including import quotas) on each of the eighty input-output categories for which there are competing imports. A 30 per cent reduction in protection means reducing this tariff equivalent by 30 per cent, such as from 40 per cent to 28 per cent.

B. Trade and other data

Data on Australian imports by country of origin for various years were provided by the Industries Assistance Commission. Commodities were classified according to the ASIC 68 coding and this was converted to the input-output classification used in the ORANI 77 model by means of a concordance also provided by the Industries Assistance Commission. These data specify approximately 250 countries of origin. These were then divided into LDCs and NDCs in accordance, as far as was possible, with the classification provided in World Bank (1981), which makes the division of a 1979 GNP per capita of around US$4,400.

Countries, territories, etc. with populations under one million are not listed in this publication and in some cases arbitrary assignments were necessary when per capita income data were unavailable. Small Pacific island states comprised most such cases but the volumes of trade involved are extremely small. The division between low and middle income LDCs is also based on 1979 GNP per capita as published in World Bank (1981), the "low income" LDCs being those with GNP per capita less than US$375.

Data on output by input-output industry were derived from the 1968-69 and 1977-78 input-output tables. Employment data by input-output industry were provided by the Industries Assistance Commission.
### Table A.1: Data Bases Used in Simulations

<table>
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<tr>
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<th>1968-69 variant</th>
<th>1977-78 variant</th>
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<tr>
<td>Input-output data</td>
<td>Input-Output Tables</td>
<td>Input-Output Tables</td>
</tr>
<tr>
<td>Import shares</td>
<td>1968-69</td>
<td>1977-78</td>
</tr>
<tr>
<td>Tariff equivalent of protection</td>
<td>1968-69</td>
<td>1977-78</td>
</tr>
</tbody>
</table>

### Table A.2: Summary of Macroeconomic Effects of a 30% Reduction in All Rates of Protection (percentage change)

<table>
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<tr>
<th></th>
<th>1968-69 variant</th>
<th>1977-78 variant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregate Imports</td>
<td>2.069</td>
<td>1.793</td>
</tr>
<tr>
<td>Aggregate Exports</td>
<td>2.066</td>
<td>2.198</td>
</tr>
<tr>
<td>Balance of Trade (Exports-Imports) $(\text{$m})$</td>
<td>-8.1</td>
<td>36.3</td>
</tr>
<tr>
<td>Consumer Price Index</td>
<td>-1.933</td>
<td>-2.270</td>
</tr>
<tr>
<td>Aggregate Employment</td>
<td>-0.068</td>
<td>-0.034</td>
</tr>
</tbody>
</table>

* a. All units are percentage changes except the Balance of Trade which has units millions of Australian dollars in current prices.
FOOTNOTES

* This paper has benefited greatly from the author's discussions with P.J. Lloyd. The analytic approach used in Section II draws in part on our joint paper, Warr and Lloyd (1982). The paper also benefited from the comments of Max Corden and from the research assistance of Prué Phillips and Chris Cheah. The research makes extensive use of the ORANI general equilibrium model of the Australian economy developed as a component of the IMPACT project and described in Dixon, et. al. (1982). Assistance with the ORANI simulations was provided by Robert Butterworth and Brian Parmenter. Tony Lawson assisted with provision of data and the interpretation of some ORANI results.

1. Average nominal rates of protection on dutiable items were estimated by Cline (1978, p.10). These were, in 1973: United States 9 per cent, Canada 14 per cent, Japan 11 per cent and EEC 9 per cent. For Australia (not included in Cline's data), the comparable rate in 1973-74 was 18 per cent. The data on economy-wide rates of protection for Japan and the EEC miss the increase in the rate of agricultural protection occurring in the late 1970s, and also the increased use generally of non-tariff barriers. When attention is confined to manufactured goods the corresponding rates were: United States 9.5 per cent, Canada 14.2 per cent, Japan 12.5 per cent, EEC 9 per cent and Australia 23 per cent.

2. See, for example, the report of the Influential, government-appointed Harries Committee, Committee on Australia's Relations With the Third World (1979). This report strongly advocates (p.131) that rather than "to seek to use our trade policies to isolate ourselves from the consequences of Third World
industrialisation”, Australia should “set out deliberately and energetically to facilitate the transition to a more outward-looking Australian industrial structure”.

3. Other studies along these general lines include Krueger (1971, 1978a, 1978b), Cline et al. (1978) and Birnberg (1979). Krueger (1971) draws on the U.S. input-output tables to argue that U.S. import quotas on LDC exports do not succeed in raising employment in the U.S. Krueger (1978a and 1978b) draws on time series data for the U.S. to argue that increased LDC exports of manufactured goods to the U.S. have little discernible effect on employment or output in the American industries affected. Cline et al. (1978) and Birnberg (1979) utilize econometrically estimated aggregate price elasticities of demand for imports from various countries to project the import effects of reduced protection. Several significant and interesting conclusions emerge from this. The present study takes this a step further by conducting the analysis within a full general equilibrium model of the domestic economy. The qualitative conclusions that emerge for Australia generally support those obtained for other OECD countries by Cline and Birnberg.

4. The LDCs are defined as in World Bank (1981) to be those countries with 1979 GNP per capita below U.S. $4,400. The ASEAN (Association of South East Asian Nations) countries comprise Indonesia, The Philippines, Singapore, Thailand and Malaysia. The NICs (newly industrializing countries) comprise Taiwan, South Korea, Hong Kong and Singapore. These two groups of LDCs are isolated because of their political importance to Australia. Note that Singapore belongs to both ASEAN and the NICs. The other LDCs
are divided into "low" and "middle" income groups as in World Bank (1981), which makes the separation at a 1979 GNP per capita of U.S. $375.


6. The nominal rates of protection by input-output category on which these calculations are based represent the tariff equivalent of all major forms of protection including tariffs, excise taxes and import quotas.

7. Further details on the characteristics of the simulation model used are presented in the Appendix to this paper and in Warr and Lloyd (1982).

8. As before, "rate of protection" means the tariff equivalent of all forms of protection which are present. A thirty per cent reduction means, for example, that the rate of protection applying to a commodity receiving a 40 per cent rate of protection is reduced by 12 points, to 28 per cent. It does not mean a thirty per cent reduction in the domestic price. In the above case, the domestic price falls from an index of 140 to 128, a reduction of 8.6 per cent.

9. I am particularly indebted to P.J. Lloyd for suggesting this term.

10. The relevant weights are average shares. Writing $m_k$ and $a_k$ for country group k's marginal and average shares, respectively, $\Gamma_k = m_k/a_k$ and so $\sum_{k=1}^{K} k_{k} = \sum_{k=1}^{K} m_{k}$. $\Gamma_k = m_k/a_k$ and so $\sum_{k=1}^{K} k_{k} = \sum_{k=1}^{K} m_{k}$. 11. The simulated effect of reduced protection on most endogenous variables is smaller than might have been expected. The reason is
that the price elasticity of demand for imports which the parameters of the model imply is relatively low. From Table A.2, a 30% reduction in all rates of protection leads to a 1.79 per cent rise in aggregate imports. Assuming an average rate of protection of 18 per cent this implies a 4.57 per cent reduction in the domestic price, implying a price elasticity of demand for aggregate imports of around -0.4. This lies within, but towards the lower end of the range of estimates for other OECD countries provided by Cline, et al (1978).

12. It has been possible to extend the trade data series to include the years 1978-79 and 1979-80. The index of discrimination against LDCs for these years was calculated at 1.013 and 1.004, respectively. Problems caused by the revised commodity classification introduced in these years make these calculations less reliable than those for the earlier years.

13. The indices of discrimination for China and India rose over the period from 1.41 to 2.41 and 0.80 to 1.95, respectively.

14. These indices of discrimination represent the change in imports of all commodities from LDCs in response to a cut in the rate of protection applying to a specific commodity relative to the corresponding change in total imports from all countries (LDCs' marginal share) divided by the LDCs' share of imports of all commodities (LDCs' average share).

15. Output rises in the primary sector in all cases but falls in the non-traded sector in four cases. This occurs because the production of these commodities is intensive in the use of electricity and domestic transport facilities.

16. In interpreting the results for commodities 9 and 10 it should be
kept in mind that reduced protection of these commodities causes LDC imports to fall and this reverses the sign of the employment effects presented.

17. It should be stressed that this result is based on a static analysis and that dynamic considerations may point in a very different direction. As the comparative advantage of the most advanced LDCs shifts towards more capital and skill-intensive goods, a system of NDC protection which favours the most labour-intensive goods would inhibit this transition. For example, Korea is already becoming a significant exporter of motor vehicles and NDC protection which favoured imports of textiles, clothing and footwear at the expense of motor vehicles may not be in Korea's long term interests.

18. This breakdown is possible because the ORANI model distinguishes nine types of labour. Four of these are "blue collar" categories, three are "white collar" and the other two are "rural workers" and "armed services". Blue collar workers account for 46 per cent of the workforce. The simulations hold the real wage of each of these categories of labour constant, so the average real wage of all employed workers will change slightly in response to a change in the composition of the workforce.
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