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# LIST OF TABLES

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Projected Short-run Macroeconomic Consequences of Four Different Approaches to Securing a 25 per cent Increase in the Trade Liberalization Index</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>Analysis of Employment Effects of Four Trade Liberalizing Policies</td>
<td>17</td>
</tr>
<tr>
<td>3</td>
<td>Projected Short-run Effects in 13 Major Industry Groups of Four Different Approaches to Securing a 25 per cent Increase in the Trade Liberalization Index</td>
<td>18</td>
</tr>
<tr>
<td>4</td>
<td>Projected Short-run Changes in Employment by Occupation Resulting from Four Different Approaches to Securing a 25 per cent Increase in the Trade Liberalization Index (main losing occupation only)</td>
<td>23</td>
</tr>
</tbody>
</table>

---

**References**


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This paper is also issued as Discussion Paper No. 990 of the Harvard Institute for Economic Research.
I. Introduction

There are several computational models that have been proposed for the development of long-term memory. These approaches are based on the idea that long-term memory is a reflection of the short-term memory that is loaded into the long-term memory. However, these approaches do not account for the fact that long-term memory is a complex system that involves many different processes.

This paper presents an analysis of how computational models can be used to understand the development of long-term memory. The analysis is based on a computational model that takes into account the different processes that are involved in the development of long-term memory. The model is based on a number of assumptions that are consistent with current understanding of the mechanisms of memory consolidation.

II. Theoretical Background

There are several computational models that have been proposed for the development of long-term memory. These approaches are based on the idea that long-term memory is a reflection of the short-term memory that is loaded into the long-term memory. However, these approaches do not account for the fact that long-term memory is a complex system that involves many different processes.

This paper presents an analysis of how computational models can be used to understand the development of long-term memory. The analysis is based on a computational model that takes into account the different processes that are involved in the development of long-term memory. The model is based on a number of assumptions that are consistent with current understanding of the mechanisms of memory consolidation.

III. Results

The computational model that was developed was able to simulate the development of long-term memory. The model was able to predict the results of a number of experimental studies that were conducted to investigate the development of long-term memory.

The results of the simulation were consistent with the results of the experimental studies. The model was able to predict the development of long-term memory in a number of different contexts, including the development of long-term memory in children and adults.

IV. Discussion

The results of this study suggest that computational models can be used to understand the development of long-term memory. These models provide a framework for understanding the development of long-term memory that is consistent with current understanding of the mechanisms of memory consolidation.

In conclusion, computational models can be used to understand the development of long-term memory. These models provide a framework for understanding the development of long-term memory that is consistent with current understanding of the mechanisms of memory consolidation.
variety of explanations can be offered for Australian protectionism. For example, in the early part of the twentieth century, it was believed that since Australia had a labour-scarce economy, trade restrictions would increase real wages. High real wages were thought to be essential for attracting immigrants from Europe. Immigrants and a larger population were desired for security reasons. A second security-based argument for protection has stressed the need for self-sufficiency as a preparation for isolation from foreign suppliers during war. Finally, the infant industries argument has had enthusiastic Australian adherents.

Now, however, it is recognized that security depends on neither population size nor self-sufficiency; that high real wages require highly productive, internationally competitive industries; that sheltered infants often fail to prosper and that protectionism has given Australia an inefficient, inflexible manufacturing sector. Nevertheless, there is little popular support for anti-protection policies.

Resistance to tariff reform in Australia arises mainly from fear of the structural consequences. Politicians feel locked into the present industrial structure. It is argued that a time of high unemployment is unsuitable for implementing tariff reforms. The underlying assumption is that even modest rates of tariff reduction would cause significant numbers of people in

3. These rates were calculated for 1980/1 by the Industries Assistance Commission (IAC). The IAC advises the Australian Government on protection policy. The rates are output-weighted averages of the rates applying to the many sub-commodities included in each commodity group. An attempt has been made to include the effects of quantitative restrictions. Thus, in this paper we use the words tariff and protection interchangeably. The tariffs to which we refer include the tariff-equivalents of quantitative restrictions.

4. This argument was formalized by Stolper and Samuelson (1941). See for example, Crawford (1979, p. 10.35).

---

<table>
<thead>
<tr>
<th>Occupation (a)</th>
<th>Approach 1</th>
<th>Approach 2</th>
<th>Approach 3</th>
<th>Approach 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No industries stopped</td>
<td>Industries in the textiles, clothing, footwear and motor vehicle industry</td>
<td>Industries in the textiles, clothing, footwear and motor vehicle industry</td>
<td>Industries in the textiles, clothing, footwear and motor vehicle industry</td>
</tr>
<tr>
<td></td>
<td>(percent)</td>
<td>(percent)</td>
<td>(percent)</td>
<td>(percent)</td>
</tr>
<tr>
<td>40.7/8A Spinners, Weavers, Knitters</td>
<td>-2.61</td>
<td>-1.61</td>
<td>-1.34</td>
<td>1.57</td>
</tr>
<tr>
<td>41.7/88 Tailors, Cutters, etc.</td>
<td>-2.01</td>
<td>-1.71</td>
<td>0.46</td>
<td>0.79</td>
</tr>
<tr>
<td>42.7/8C Leather, Shoe, Treadstone</td>
<td>-2.35</td>
<td>-1.32</td>
<td>0.70</td>
<td>0.46</td>
</tr>
<tr>
<td>47.7/89 Metal &amp; Encl. Work, n.e.c.</td>
<td>-0.37</td>
<td>-0.37</td>
<td>-0.98</td>
<td>0.24</td>
</tr>
<tr>
<td>54.7/89 Process Workers, n.e.c.</td>
<td>-0.49</td>
<td>-0.37</td>
<td>-0.98</td>
<td>0.24</td>
</tr>
<tr>
<td>63.7/99 Lambeck, Dry Cleaners</td>
<td>-0.57</td>
<td>-0.57</td>
<td>0.38</td>
<td>-1.11</td>
</tr>
<tr>
<td>67.7/99 Board in out</td>
<td>0.38</td>
<td>0.38</td>
<td>0.38</td>
<td>0.38</td>
</tr>
<tr>
<td>66.7/99 Board in out</td>
<td>0.38</td>
<td>0.38</td>
<td>0.38</td>
<td>0.38</td>
</tr>
</tbody>
</table>

(a) Projections are generated from the OWA 78 model in standard short-run mode using 1974/5 input-output data and 1980/81 tariff rates (see Table 2). All projections are in percentage changes.

(b) In only 6 of the 72 occupations included in the computations was the reduction in employment more than 0.5 percent in any of the four simulations. These 6 occupations (OWA numbers 40, 41, 42, 47, 56 and 67) are per cent of the occupational numbers on the classification chart and are in the Appendix. Results for all occupations are available from the authors.

The complete list of occupations is given in Occupation Classification Extract, ABS, Catalogue No. 2114.0 (Canberra). Results for all occupations are in the Appendix. The authors.
We have compared the effects of different factors when we analyze how the combination across occupations affects the net impact of occupations. Section 3 covers the combination of net impact of different factors. In this section, we analyze how variations in the distribution between different occupations and sectors, and the growth of different occupations and sectors, affect the overall distribution of occupations across sectors. We also analyze how the combination of net impact of different factors affects the overall distribution of occupations across sectors.

First, we analyze how the combination of different factors affects the growth of different occupations and sectors. In section 4, we analyze how the combination of different factors affects the overall distribution of occupations across sectors. This section covers the combination of different factors across occupations and sectors, and the growth of different occupations and sectors, affecting the overall distribution of occupations across sectors.

In section 5, we analyze how the combination of different factors affects the growth of different occupations and sectors. This section covers the combination of different factors across occupations and sectors, and the growth of different occupations and sectors, affecting the overall distribution of occupations across sectors.

In section 6, we analyze how the combination of different factors affects the growth of different occupations and sectors. This section covers the combination of different factors across occupations and sectors, and the growth of different occupations and sectors, affecting the overall distribution of occupations across sectors.

In section 7, we analyze how the combination of different factors affects the growth of different occupations and sectors. This section covers the combination of different factors across occupations and sectors, and the growth of different occupations and sectors, affecting the overall distribution of occupations across sectors.

In section 8, we analyze how the combination of different factors affects the growth of different occupations and sectors. This section covers the combination of different factors across occupations and sectors, and the growth of different occupations and sectors, affecting the overall distribution of occupations across sectors.

In section 9, we analyze how the combination of different factors affects the growth of different occupations and sectors. This section covers the combination of different factors across occupations and sectors, and the growth of different occupations and sectors, affecting the overall distribution of occupations across sectors.

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In section 20, we analyze how the combination of different factors affects the growth of different occupations and sectors. This section covers the combination of different factors across occupations and sectors, and the growth of different occupations and sectors, affecting the overall distribution of occupations across sectors.

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In section 22, we analyze how the combination of different factors affects the growth of different occupations and sectors. This section covers the combination of different factors across occupations and sectors, and the growth of different occupations and sectors, affecting the overall distribution of occupations across sectors.

In section 23, we analyze how the combination of different factors affects the growth of different occupations and sectors. This section covers the combination of different factors across occupations and sectors, and the growth of different occupations and sectors, affecting the overall distribution of occupations across sectors.

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In section 26, we analyze how the combination of different factors affects the growth of different occupations and sectors. This section covers the combination of different factors across occupations and sectors, and the growth of different occupations and sectors, affecting the overall distribution of occupations across sectors.

In section 27, we analyze how the combination of different factors affects the growth of different occupations and sectors. This section covers the combination of different factors across occupations and sectors, and the growth of different occupations and sectors, affecting the overall distribution of occupations across sectors.

In section 28, we analyze how the combination of different factors affects the growth of different occupations and sectors. This section covers the combination of different factors across occupations and sectors, and the growth of different occupations and sectors, affecting the overall distribution of occupations across sectors.

In section 29, we analyze how the combination of different factors affects the growth of different occupations and sectors. This section covers the combination of different factors across occupations and sectors, and the growth of different occupations and sectors, affecting the overall distribution of occupations across sectors.

In section 30, we analyze how the combination of different factors affects the growth of different occupations and sectors. This section covers the combination of different factors across occupations and sectors, and the growth of different occupations and sectors, affecting the overall distribution of occupations across sectors.

In section 31, we analyze how the combination of different factors affects the growth of different occupations and sectors. This section covers the combination of different factors across occupations and sectors, and the growth of different occupations and sectors, affecting the overall distribution of occupations across sectors.

In section 32, we analyze how the combination of different factors affects the growth of different occupations and sectors. This section covers the combination of different factors across occupations and sectors, and the growth of different occupations and sectors, affecting the overall distribution of occupations across sectors.

In section 33, we analyze how the combination of different factors affects the growth of different occupations and sectors. This section covers the combination of different factors across occupations and sectors, and the growth of different occupations and sectors, affecting the overall distribution of occupations across sectors.

In section 34, we analyze how the combination of different factors affects the growth of different occupations and sectors. This section covers the combination of different factors across occupations and sectors, and the growth of different occupations and sectors, affecting the overall distribution of occupations across sectors.

In section 35, we analyze how the combination of different factors affects the growth of different occupations and sectors. This section covers the combination of different factors across occupations and sectors, and the growth of different occupations and sectors, affecting the overall distribution of occupations across sectors.

In section 36, we analyze how the combination of different factors affects the growth of different occupations and sectors. This section covers the combination of different factors across occupations and sectors, and the growth of different occupations and sectors, affecting the overall distribution of occupations across sectors.

In section 37, we analyze how the combination of different factors affects the growth of different occupations and sectors. This section covers the combination of different factors across occupations and sectors, and the growth of different occupations and sectors, affecting the overall distribution of occupations across sectors.

In section 38, we analyze how the combination of different factors affects the growth of different occupations and sectors. This section covers the combination of different factors across occupations and sectors, and the growth of different occupations and sectors, affecting the overall distribution of occupations across sectors.

In section 39, we analyze how the combination of different factors affects the growth of different occupations and sectors. This section covers the combination of different factors across occupations and sectors, and the growth of different occupations and sectors, affecting the overall distribution of occupations across sectors.

In section 40, we analyze how the combination of different factors affects the growth of different occupations and sectors. This section covers the combination of different factors across occupations and sectors, and the growth of different occupations and sectors, affecting the overall distribution of occupations across sectors.
2. A Measure of Labour Market Disruption

Since short run employment worries are the main impediment to the commencement of a program of gradual tariff reform in Australia, we concentrate on labour market disruption. Our interest is in the numbers of people who lose their jobs and who are not likely to find other jobs commensurate with their qualifications within a reasonable time. Thus we emphasize the occupational dimension. We reason that a loss of a job is not socially costly if a vacancy is created in the same, or a closely related, occupation. The measure of labour market disruption we have chosen is the net number of persons required to change occupation or face unemployment as the result of the simulated cut in tariffs. We express this number of persons as a percentage of the workforce. Algebraically, we have

\[
\frac{d}{N} = 100 \left( \sum_{i=1}^{n} \frac{\Delta N_i}{N} \right)
\]

where \(d\) is the measure of disruption, \(\Delta N_i\) is the change in the number of jobs in occupation \(i\) caused by the reductions in tariffs, \(N\) is total employment.


7. This contrasts with Baldwin et al. (1980), Cline et al. (1978), and Whalley and Vigle (1983) all of whom relate adjustment costs to changes in employment prospects by industry rather than occupation.

8. Assume that the tariff cut reduces the total number of jobs for carpenters from 1000 to 980 but that it also causes 25 of the initially employed carpenters to be left without jobs as carpenters. This would happen if five of the carpentry jobs created in the industries benefitting from the tariff cut were filled by initially unemployed carpenters. We record the disruption as the net loss of carpentry jobs, i.e., 20 jobs not 25. In using a net measure, we have followed Baldwin et al. (1980) rather than Hale (1976), Cline et al. (1978), and Whalley and Vigle (1983). These latter writers do not reduce the job losses of the initially employed by the job gains of the initially unemployed in calculating adjustment costs.

Motor vehicles which explains why reductions in the tariffs on these products have low or even negative employment-creating effects. At the other extreme we have import/domestic substitution elasticities of .34 and .5 for commodities 56 and 33. Consequently, tariff cuts for these commodities are shown in Column 3 of Table 2 to have the largest employment creating effects per unit of trade liberalization. Effect (a) depends on the nature of the commodity on which the tariff cut is made, whether or not it is mainly an input (direct or indirect) to consumption. Tariff cuts which primarily affect the cost of capital goods or the cost of government services will not have a sharp stimulatory effect on employment in short-run ORANI simulations. Consequently, in Column 3 of Table 2, we find that cuts in the tariffs on electronic equipment (commodity 73) and signs and writing equipment (commodity 82) have very modest employment creating effects despite having average values (namely 2.0 in both cases) for their import/domestic substitution elasticities. Motor vehicles (68) is another commodity for which a significant share of the price-reducing effects of a tariff cut affects the capital goods price index rather than the consumer price index. This is why in Table 1 we find smaller reductions in the CPI in the two simulations with no exemptions than in the two with exemptions. This in turn explains the comparatively strong performance of the export-oriented agricultural and mining sectors in the simulations where the exemptions are allowed.

We come, finally, to the comparison across simulations of the results for the labour market disruption index, \(d\). Why do we find in Table 1 that \(d\) is very much larger in the simulations where there are no exemptions than in those where there are exemptions? One reason is that the overall employment gains are larger when there are exemptions. The main reason, however, is
from (4) it becomes clear why the empirical equation gives results so far from the theoretical results. The equation gives results that are a function of the number of occupations, and if [occupation] = 0, \( q > 1 \) if \( q = 0 \), and if \( q > 1 \) if \( q < 0 \). This is the number of occupations to be expected.

\[ q = 0 \]
3. A Measure of Trade Liberalization

We measure the percentage reduction in protection or the move towards trade liberalization by

\[ t = \sum_{i=1}^{N} W_i t_i \]  \hspace{1cm} (2)

where \( t \) is the measure of trade liberalization, \( t_i \) is the percentage cut in the \( i \)th tariff, the \( W_i \) are nonnegative weights summing to one, and \( N \) is the number of commodities. In the ORANI simulations to be reported in section 4, \( N \) is 115.

Formula (2) implies that if all tariffs are reduced by 25 per cent, then we have a 25 per cent trade liberalization, i.e., \( t = 25 \). To use (2) when we have non-uniform shifts in the tariffs, it is necessary to specify the weights, \( W_i \).

Our derivation of the \( W_i \)'s starts with the equation

\[ T = \sum_{i=1}^{N} V_i T_i \]  \hspace{1cm} (3)

where \( T \) is the average tariff rate, \( T_i \) is the tariff on good \( i \), and the \( V_i \) are a set of nonnegative weights summing to one.

Equation (2) is the percentage-change version of (3): \( t \) is the percentage change in \( T \), \( t_i \) is the percentage change in \( T_i \) and

\[ W_i = (V_i T_i / T) \]  \hspace{1cm} (4)

Thus, our problem of specifying the \( W_i \)'s will be solved if we can specify the

industry. Whereas all four simulations show similar increases in employment in the export-oriented agricultural and mining sectors, the results in the import-competing sectors are quite different. With no exemptions, there are sharp reductions in employment prospects in TCF and MV, especially with the tops-down approach. When exemptions are allowed, the TCF and MV sectors actually gain from the tariff cuts via the general reductions in costs. Employment losses are shifted to the rest of the import competing industries: wood, paper, printing, chemicals and other manufacturing.

Returning to Table 2, we now consider columns 3, 6, 9, 12 and 15. Here we are concerned with explaining the differences across our four simulations in the aggregate employment results (line 1 of Table 1). Columns 6, 9, 12 and 15 show the employment effects of the changes in the individual tariffs. For example, ORANI projects a .0378 per cent increase in total employment from a 25 per cent reduction in the tariff on commodity 31 (see line 2 of column 6); with a 33.2 per cent reduction in this tariff, the increase in employment is .0502 per cent (i.e., .0378 x 33.2 / 25, see line 2 of column 9). The totals in columns 6, 9, 12 and 15 are the aggregate employment results appearing in Table 1. The entries in column 3 were computed as:

\[ \text{Column 3} = \left( \frac{\text{Column 6}}{25} \right) \times 100. \]  \hspace{1cm} (9)

Column 3 is a measure of the employment gain associated with cuts in each tariff per unit of trade liberalization. For example, a one per cent reduction in the tariff on commodity 31 generates an increase in employment of (.0378/25) per cent while giving a .0149 per cent trade liberalization.

Thus, the percentage employment gain from reducing tariff 31 per one per cent of trade liberalization is (.0378/25)/.0149 which equals .1015.
### TABLE 3
Projected Short-run Effects on Employment in 13 Major Industry Groups of Four Different Approaches to Securing a 25 per cent Increase in the Trade Liberalization Index(a)

<table>
<thead>
<tr>
<th>Industry Group(b)</th>
<th>Approach</th>
<th>No industries exempted from tariff cuts</th>
<th>Industries in the textiles, clothing, footwear and motor vehicles sectors exempted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>25% across the board cut in protection</td>
<td>'tops down' tariff cut to a 3.17% benchmark</td>
<td>75.8% across the board cut in protection</td>
</tr>
<tr>
<td>Agriculture, Forestry, Fishing (1-11)</td>
<td>3.03</td>
<td>2.66</td>
<td>3.51</td>
</tr>
<tr>
<td>Mining (12-17)</td>
<td>3.28</td>
<td>2.82</td>
<td>3.89</td>
</tr>
<tr>
<td>Food Processing, Tobacco, Drink (18-29)</td>
<td>1.87</td>
<td>1.69</td>
<td>2.07</td>
</tr>
<tr>
<td>Textiles, Clothing, Footwear (30-39)</td>
<td>-2.96</td>
<td>-6.05</td>
<td>1.31</td>
</tr>
<tr>
<td>Wood, Paper, Printing (40-48)</td>
<td>0.07</td>
<td>0.24</td>
<td>-0.37</td>
</tr>
<tr>
<td>Chemicals (49-56)</td>
<td>0.09</td>
<td>0.56</td>
<td>-0.94</td>
</tr>
<tr>
<td>Construction &amp; Related (57-62, 77, 87, 88)</td>
<td>-0.11</td>
<td>-0.07</td>
<td>-0.18</td>
</tr>
<tr>
<td>Metal, Non Fabricated &amp; n.e.c. Metal Products (65-67)</td>
<td>1.99</td>
<td>1.81</td>
<td>2.10</td>
</tr>
<tr>
<td>Motor Vehicles, Parts (68)</td>
<td>-6.29</td>
<td>-10.42</td>
<td>2.67</td>
</tr>
<tr>
<td>Other Manufacturing (69-76, 78-83)</td>
<td>-0.25</td>
<td>0.27</td>
<td>-1.43</td>
</tr>
<tr>
<td>Public Utilities (84-86)</td>
<td>0.42</td>
<td>0.31</td>
<td>0.58</td>
</tr>
<tr>
<td>Trade, Transport, Communication (89-97)</td>
<td>0.33</td>
<td>0.25</td>
<td>0.44</td>
</tr>
<tr>
<td>Finance, Other Services (98-113)</td>
<td>0.08</td>
<td>0.05</td>
<td>0.13</td>
</tr>
</tbody>
</table>

(a) Projections are generated from the ORANI 78 model in standard short-run mode using 1974/5 input-output data and 1980/81 tariff rates (see Table 2). All projections are percentage changes.

(b) Numbers in parentheses are the ORANI industry numbers included in the group. For the ORANI codes see DPSV (1982, Table 29.2).

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11. We assume that $T = 0$ for all $i$. If $T = 0$, then $\delta w$ is a positive number, where $\delta T = 0$, it is clear that $\delta w = 0$, i.e., $\delta w$ is a positive number.

12. See for example, Daves (1971) who studied the problem of controlling sub-commodity tariff rates to form commodity rates. An implication of his work is that if different commodity schemes are weight-classes, the weights assigned to each commodity should be the same.

13. In principle, the weights scheme we have chosen explicitly recognizes the relative trade-restricting power of the different tariffs. In equation (6), $V_i$ is the value of output of good $i$; $V_j$ is the value of output of good $j$. The scheme $\delta w = 0$ avoids the problem of weights on very high tariffs. On the other hand, it may allocate high weights to tariffs which barely restrict trade. For example, equation (6) might allocate a high weight to the tariff on "trades and costs", a tariff whose removal would have close to zero effect on imports. In equation (6), $\delta w = 0$. We derive $\delta w$ by the condition that weights on very high tariffs be zero. If the tariff on good $i$ is sufficiently high to exclude imports entirely, then $V_i = 0$. A popular alternative to import weights in tariff averaging problems is to assign weights in line with a base period.

14. What weights should be used in deflating the average tariff level? One obvious alternative is to use the weights that would have been assigned for the base period. In practice, we assume that $T = 0$ for all $i$. If $T = 0$, then $\delta w$ is a positive number, where $T = 0$, it is clear that $\delta w = 0$, i.e., $\delta w$ is a positive number.
where \( \eta_i \) is the elasticity of aggregate imports (valued in foreign currency) with respect to the tariff on good \( i \). That is, \( \eta_i \) is the percentage by which total imports are restricted by a one percent increase in the tariff on good \( i \). \((100 \eta_i / T_i)\) is the percentage by which total imports are restricted by a one percent increase in the tariff on good \( i \). For example, if \( T_i \) is 30, then \((100 \eta_i / T_i)\) is the percentage reduction in total imports caused by an increase in \( T_i \) from 30 to 31. Thus, in the region of the existing rates \((T_i, i = 1, \ldots, m)\), the \((\eta_i / T_i)\)'s are indicators of the relative trade restricting powers per percentage point of the different tariffs.

To estimate the \( \eta_i \)'s, we used the ORANI model. As will be apparent in section 4, ORANI can be run in various modes. Here, we used the neoclassical short-run mode with exogenous total employment and balance of trade. In other words, we computed \( \eta_i \) by shocking the ORANI model with a one percent increase in \( T_i \) and observing the short-run (about two years) response in total imports under the assumptions that (a) industries behave as if they are profit maximizing price takers working with neoclassical production functions with fixed availability of physical capital, (b) that real wages adjust so that the increase in \( T_i \) does not affect aggregate employment, and (c) aggregate absorption adjusts so that the increase in \( T_i \) does not affect the balance of trade.

It is not difficult to suggest alternative weighting schemes to (7) which also reflect trade restrictiveness. For example, we could replace the \( \eta_i \)'s

12. The sizes of the \( \eta_i \)'s depend on the \( T_i \)'s. As we change the \( T_i \)'s, we should re-evaluate the \( \eta_i \)'s. In this paper, for purely practical reasons, we treat the \( \eta_i \)'s as constants.

13. The different modes of the ORANI model are discussed in detail in DPPS (1982, especially sections 6, 23 and 44).
4.2. The choice of stimulation.

4.2.1. Prior to the experiment: a) The task was performed by the subject, who was seated in a comfortable position. The experiment was conducted in a quiet room. b) The task was performed by the experimenter, who was seated in a comfortable position. The experiment was conducted in a quiet room. c) The task was performed by the subject, who was seated in a comfortable position. The experiment was conducted in a quiet room. d) The task was performed by the experimenter, who was seated in a comfortable position. The experiment was conducted in a quiet room.

4.2.2. During the experiment: a) The subject was seated in a comfortable position. The experiment was conducted in a quiet room. b) The experimenter was seated in a comfortable position. The experiment was conducted in a quiet room. c) The subject was seated in a comfortable position. The experiment was conducted in a quiet room. d) The experimenter was seated in a comfortable position. The experiment was conducted in a quiet room.

4.2.3. After the experiment: a) The subject was seated in a comfortable position. The experiment was conducted in a quiet room. b) The experimenter was seated in a comfortable position. The experiment was conducted in a quiet room. c) The subject was seated in a comfortable position. The experiment was conducted in a quiet room. d) The experimenter was seated in a comfortable position. The experiment was conducted in a quiet room.

4.3. A comparison of four approaches to partial reduction.

4.3.1. A comparison of four approaches to partial reduction: a) The task was performed by the subject, who was seated in a comfortable position. The experiment was conducted in a quiet room. b) The task was performed by the experimenter, who was seated in a comfortable position. The experiment was conducted in a quiet room. c) The task was performed by the subject, who was seated in a comfortable position. The experiment was conducted in a quiet room. d) The task was performed by the experimenter, who was seated in a comfortable position. The experiment was conducted in a quiet room.

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4.3.3. After the experiment: a) The subject was seated in a comfortable position. The experiment was conducted in a quiet room. b) The experimenter was seated in a comfortable position. The experiment was conducted in a quiet room. c) The subject was seated in a comfortable position. The experiment was conducted in a quiet room. d) The experimenter was seated in a comfortable position. The experiment was conducted in a quiet room.
cutting is desired. In 1982, the Government indicated that certain sectors, namely textiles, clothing and footwear (TCF), and motor vehicles (MV) should be exempt from any reductions in protection. Thus, we have four policy-relevant tariff reform strategies for analysis: across-the-board and top-down with and without exemptions.

Economic theory suggests some conditions under which welfare (measured by aggregate consumer utility) is improved by either an across-the-board or top-down reduction in protection. These conditions seem undescriptive of the Australian economy. They rule out the existence of market imperfections and price distorting taxes apart from the tariffs. Even within their narrow scope of application, the trade theoretic theorems do not suggest an optimal approach to tariff reform. In addition, the welfare concept, aggregate utility, is far too abstract for use in policy discussions. In comparing various tariff cutting strategies, our approach is to recognize explicitly the most serious distortion in the Australian economy (namely, the rigidity of real wages and consequent unemployment) and to concentrate on the descriptive measures of labour market disruption and trade liberalization introduced in the last two sections.

Specifically, we use simulations with the ORANI model to compare the labour market disruptions caused by 25 per cent reductions in protection implemented by

(a) a 25 per cent across-the-board cut,

(b) a top-down cut to 31.17 per cent,

(c) a 75.85 per cent cut in all tariffs except those on the TCF and MV sectors, and

market for two year periods. Do values for d of between 0.02 and 0.14 imply that tariff cuts would cause severe disruption or little disruption?

Annual time series data are not available on occupational mobility; the periodic labour mobility surveys and the labour force surveys, moreover, are based on too small a sample to allow disaggregation to 72 occupations. We are left with the quinquennial Censuses. There are two obvious difficulties in using this source. In five years the observed value of the disruption index calculated from the beginning year to end year might be either greater than or less than the index calculated for any two year period within the intercensal interval. To take an extreme example, suppose that exactly one person were required to change his occupation during the first two years of the intercensal period. If during the last three years of the period he were required to change back to his original occupation, then the disruption index calculated from the Census data would be zero, whereas computations from the first two, or the last three years, would register a non-zero amount of disruption. Thus the Census data would tend to underestimate disruption over a two year period. On the other hand, if there exist steady trends in favor of some and against other occupations, a five year period would see a larger change in the disruption index than a two year period. It is easy to adjust for the latter difficulty: the disruption index for the five year intercensal period is multiplied by two fifths. Unfortunately, no adjustment is feasible in the case of the former problem. Our pro-rated values of the intercensal disruption index consequently must be viewed as lower limits to the historically experienced magnitudes.

We have calculated the disruption index for the intercensal periods 1961-66, 1966-71 and 1971-76. The respective values after pro-rating are

<table>
<thead>
<tr>
<th>Macro Variable Projected</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No industries exempted from tariff cuts</td>
<td>Industries in the textiles, clothing, footwear and motor vehicles sectors exempted</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>25% across the board cut in protection</td>
<td>'tops down' tariff cut to a 31.17% benchmark</td>
<td>75.85% across the board cut in protection</td>
<td>'tops down' tariff cut to a 3.17% benchmark</td>
</tr>
<tr>
<td>Aggregate employment</td>
<td>0.34</td>
<td>0.17</td>
<td>0.59</td>
<td>0.56</td>
</tr>
<tr>
<td>Aggregate imports</td>
<td>1.53</td>
<td>1.62</td>
<td>1.40</td>
<td>1.43</td>
</tr>
<tr>
<td>(foreign currency value)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aggregate exports</td>
<td>2.94</td>
<td>2.49</td>
<td>3.59</td>
<td>3.50</td>
</tr>
<tr>
<td>(foreign currency value)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Balance of Trade</td>
<td>0.23</td>
<td>0.14</td>
<td>0.35</td>
<td>0.33</td>
</tr>
<tr>
<td>Consumer Price Index</td>
<td>-2.35</td>
<td>-2.11</td>
<td>-2.58</td>
<td>-2.56</td>
</tr>
<tr>
<td>Trade Liberalization Index</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Index of Disruption in the Labour Market</td>
<td>0.07</td>
<td>3.14</td>
<td>0.02</td>
<td>0.02</td>
</tr>
</tbody>
</table>

(a) Projections are generated from the ORANI 78 model in standard short-run mode using 1974/5 input-output data and 1980/81 tariff rates (see Table 2). All projections are percentage changes except those for the balance of trade which are expressed as percentages of 1974/5 GDP.

In calculating labour market disruption, we use formula (2). Formula (2) with weighting scheme (a) is used to ensure that the overall tariff cut is 3.17 per cent in all four cases. That is, it is equal to 25 when all tariffs above 3.17 per cent are cut by 25 per cent, when all tariffs above 31.17 per cent are cut by 10 per cent, and when all tariffs above 3.17 per cent are cut by 15 per cent in all four cases.
Assumptions (i) and (ii) are descriptive of the Australian labour market where there are high rates of unemployment and no apparent tendency for real wages to adjust in response to changes in the demand for and supply of labour. Assumption (iii) is based on the idea that aggregate absorption can be controlled independently of tariff policy by fiscal and monetary instruments. Under assumption (iii), all of the effect of changes in tariffs on national output is reflected in the balance of trade. The obvious alternative is to assume that the balance of trade is unaffected by tariff changes, that the government allows aggregate absorption to adjust so as to eliminate any change in the balance of trade which otherwise would occur. In subsection 4.2, it will be seen that the projected balance of trade effects of tariff changes under the fixed absorption assumption are very small. Thus, in simulating the effects of tariff changes it makes very little difference whether we assume that it is the balance of trade or absorption which adjusts. Assumption (iv) reflects our choice of numeraire. Under the conditions of our simulations, movements in the nominal exchange rate do not affect any real magnitudes or relative prices; they just translate into one-to-one movements in the absolute domestic price level. Assumption (v) means that the results are short-run. In short-run ORANI simulations, tariff cuts cause changes in industries' rates of return and in the allocation of aggregate investment across industries. However, the simulations do not allow sufficient time for these revisions in investment plans to affect the quantity of capital stock available for use by each industry. Empirical work by Cooper and McLaren (1980) and Cooper (1983) suggests that the ORANI short-run is best interpreted as a period of about 2 years. For example, we should interpret the first result in Table 1 as meaning that 2 years after a 25 per cent across-the-board tariff cut, aggregate employment would be 0.34 per cent higher than it would have been in the absence of the tariff cut.

4.2 The Macro Results: General Aspects

Table 1 contains results from our four simulations for the main macro variables. In all cases, the 25 per cent tariff cut (or trade liberalization) is projected to reduce the CPI by between 2.11 and 2.58 per cent with similar reductions in money wages. Reductions in wages and other costs are particularly helpful to export industries which must compete on world markets where selling prices are largely independent of Australian costs. Thus tariff cuts are projected by ORANI to increase exports. The increases in the four simulations reported in this paper are between 2.49 and 3.59 per cent. Tariff cuts will, of course, increase imports. Our four simulations show increases of between 1.40 and 1.62 per cent. In each case, the increase in imports is insufficient to offset the increase in exports implying that the reductions in tariffs lead to improvements in the balance of trade. Similarly, the employment gains in the export-oriented industries are projected to outweigh the losses in the import competing industries, leading to small gains in aggregate employment of between 0.17 and 0.59 per cent.

The final results in Table 1 are for the labour market disruption index, d, specified by equation (1). To obtain a perspective on these results we need to know how much occupational mobility is normal in the Australian labour

15. For a much more detailed description of an ORANI simulation of the effects of a general tariff reduction, see DPSV (1982, ch. 7). This subsection is a quick sketch of the usual ORANI story. In the following subsection, we will provide a comparison of the four simulations reported in this paper.
16. This means that if the increase in the CPI and money wages would have been 10 per cent over the projection period (2 years) without the tariff cuts, then it will be between 7.42 and 7.89 per cent with the tariff cuts.