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WHO WILL GET THE JOBS?

LABOUR MARKET EFFECTS OF A 25 PER CENT ACROSS-THE-BOARD TARIFF REDUCTION

by

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CONTENTS

LIST OF TABLES

ABSTRACT

This paper presents an analysis of the employment effects of a 25 per cent across-the-board tariff cut on various groups of workers. The workers are differentiated on the basis of (a) occupation, (b) demographic characteristics, (c) country of birth, (d) area of residence, and (e) highest qualification. We compare the employment effects under two alternative assumptions regarding the wage-determining process in the economy. The analysis depends on simulations using an extended version of the ORANI model of the Australian economy taken in conjunction with unit record data from an updated version of the 1981-82 Income and Housing Survey database.

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1. INTRODUCTION

The current round of the policy debate on protectionism was perhaps sparked by the following declaration by the Prime Minister at the 16th Conference of Economists in August 1987:

> " ... on this list of micro reforms, the next three years will see a continuation of Labor's efforts to lower gradually the levels of industry protection. We cannot, as a nation, hope to be internationally competitive if we persist in insulating key industries against import competition. We are asking Australia to stand on its own two feet after a period of adjustment."
> (R.J. Hawke, 1987)

Since then, the media has been rife with speculation about an across-the-board tariff cut being announced at the forthcoming May mini-Budget:

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* I am grateful to Bruce Parsell and Alan Powell for their helpful comments on an earlier draft of this paper.

> "The Government is expected to announce an across-the-board cut in industry protection as part of a May mini-Budget that will contain major structural reforms, both in industry assistance and business taxation."
>
> (THE AUSTRALIAN, January 10, 1988)

In this environment, it is opportune to undertake a detailed study of the labour market effects of a reduction in protection. This paper aims to do so.

The effect of increased trade liberalization in Australia on the industrial composition of output and employment has already been examined in a number of studies.[1] Thus, the question of where the new jobs will be has been answered by several economists, including Corden (1979):

> "First, some of the extra jobs will be in export industries, including some industries that may turn into export industries as a result of the gradual adjustment process. Secondly, they will be wherever the Government chooses to spend its money - whether on education, defence, public transport, or whatever. Thirdly, new employment will be where companies and individuals choose to spend their extra incomes, whether on consumption or investment."

Since then, users of the ORANI[2] multisectoral model of the Australian economy have provided detailed quantitative estimates of the projected employment changes outlined above. ORANI distinguishes 112 industries and has been used to examine the effects of tariff cuts on

employment in each of these industries under alternative economic scenarios.

What existing studies of trade liberalization lack is a detailed examination of who is likely to be affected by the projected employment changes. Are those who change their jobs: Males or females? Victorians or Queenslanders? City-people or country-folk? Trades-persons or graduates? Migrants or Australian-born? Carpenters or nurses? ... and so on. Answers to these questions are provided in this study.

In this paper we present an analysis of the short-run employment consequences of tariff reductions on various groups of interest. Such analysis has only been made possible with the recent availability of data from the 1981-82 Income and Housing Survey (IHS) in unit record form. The analysis depends on simulations using an extended version of the ORANI model of the Australian economy, taken in conjunction with an updated version of the IHS database. This tops-down ORANI-Income Distribution Model (henceforth, ORANI-IDM) has been used in a number of recent studies that analyze the distributional implications of a variety of economic changes in Australia.[3]

The rest of the paper is organized as follows. How the simulations are set up is described in Section 2. Section 3 describes the interface between the extended ORANI model and the IHS database. Section 4 contains highlights of the macro results. The disaggregated employment results are presented in Section 5. Finally, Section 6 concludes with a few brief remarks pertinent to the current policy debate on tariff reductions.

2. SPECIFICATION OF THE SIMULATIONS

2.1 The Model

In recent applications, the ORANI model has often been augmented with a system of equations designed to improve its description of the national and government accounts. This extension, referred to as the NAGA model, is specified in Meagher and Parmenter (1985 and 1987). It is this extended ORANI-NAGA model that is interfaced with the IHS database to form ORANI-IDM. The base year for ORANI-IDM is 1984-85.

To generate our employment results, we first compute solutions to the combined ORANI-NAGA model to determine the effects of the decrease in protection on a range of macro and structural variables of the economy.[4] A selection of these variables (concerning employment) is then used to revise the population weights of all employed persons in the IHS unit records. (This interface is described in more detail in Section 3.) The projections for the employment changes for various groups of interest are obtained by comparing the employment levels in the revised (post-shock) records with those in the original (pre-shock) ones.

The pre-shock records themselves are derived from the 1981-82 IHS unit record data by updating weights and incomes to conform to historical values for 1984-85.[5] The updating or 'aging' technique adopted is a standard one developed by microanalytic simulators, and is commonly referred to as 'static adjustment aging' (see Orcutt, Merz and Quinke, 1986). It essentially attempts to take account of structural changes in the economy by imposing aggregate constraints on the database.

For example, the population weight attached to each individual in the sample was adjusted so that the new aggregates for the number of persons belonging to various labour force categories (employed, unemployed, and not in the labour force) obtained from the revised IHS data were the same as those obtained from published sources for 1984-85. Similar adjustments were made to incomes obtained from various sources.

2.2 The Tariff Cuts

In the historical debate on tariff reform in Australia, we can distinguish two approaches: across-the-board and tops-down. Under the first of these approaches, all tariffs are cut by a uniform percentage. Under the second, all tariff rates greater than, say, α are cut to α while all tariffs below α are left unchanged. In this analysis, we limit ourselves to examining the effects of an across-the-board tariff cut only.

Table 1 provides estimates of the nominal levels of protection provided to various manufacturing industries in 1986-87. These are estimates of the extent to which tariff and quota protection raised the domestic prices of imported goods in that period. Some of the most highly assisted industries in Australia -- the textile, clothing and footwear (TCF) industries and the passenger motor vehicles (PMV) industries -- are protected by quotas. We impose an across-the-board cut in the rates of manufacturing protection listed in Table 1, i.e. in the tariff rates and in the tariff-equivalents of all quotas. It should be noted that in the current economic environment, the main source of effective protection is likely to be tariffs rather than quotas. As Fallon and Thompson (1987) have shown, because of the substantial

TABLE 1

Nominal Rates of Protection for 1986-87

ORANI COMMODITY Number	Name	NOMINAL RATE OF PROTECTION (per cent)
19	Milk products	25.26
20	Fruit and vegetable products	11.20
21	Margarine, oils and fats n.e.c.	6.75
22	Flour mill and cereal food products	8.39
23	Bread, cakes and biscuits	0.46
24	Confectionery and cocoa products	15.75
25	Other food products	10.10
26	Soft drinks, cordials and syrups	10.68
27	Beer and malt	30.67
28	Other alcoholic beverages	20.56
29	Tobacco products	7.25
30	Cotton ginning, wool scouring , etc.	2.13
31	Man-made fibres, yarns, etc.	30.63
32	Cotton yarns, broadwoven fabrics, etc.	28.57
33	Worsted and woollen yarns, etc.	12.19
34	Textile finishing	36.20
35	Textile floor coverings, felt, etc.	33.67
36	Other textile products	18.94
37	Knitting mills	63.04
38	Clothing	64.03
39	Footwear	63.53
40	Sawmill products	5.09
41	Veneers and manufactured wood boards	18.88
42	Joinery and wood products n.e.c.	12.46
43	Furniture and mattresses	22.27
44	Pulp, paper and paperboard	9.27
45	Bags, fibreboard containers	20.60
46	Paper products n.e.c.	20.94
47	Newspapers and books	0.48
48	Commercial printing	18.99

...continued

TABLE 1 (continued)

ORANI COMMODITY Number	Name	NOMINAL RATE OF PROTECTION (per cent)
49	Chemical fertilisers	0.97
50	Other basic chemicals	11.76
51	Paints and varnishes	13.43
52	Pharmaceutical products, etc.	6.21
53	Soap and detergents	17.56
54	Cosmetics and toilet preparations	6.07
55	Other chemical products	11.19
56	Petroleum and coal products	0.12
57	Glass and glass products	6.09
58	Clay products and refractories	3.65
59	Cement	3.26
60	Ready mixed concrete	0.00
61	Concrete products	0.61
62	Other non-metallic mineral products	8.90
63	Basic iron and steel	8.58
64	Basic non-ferrous metals and products	2.68
65	Structural metal products	12.51
66	Sheet metal products	15.14
67	Other metal products	17.35
68	Motor vehicles and parts, etc.	27.10
69	Ships and boats	14.80
70	Railway rolling stock and locomotives	17.44
71	Aircraft	1.64
72	Photographic and scientific equipment	4.68
73	Electronic equipment	19.03
74	Household appliances and water heaters	22.59
75	Other electrical equipment	18.24
76	Agricultural machinery	7.09
77	Construction machinery, etc.	17.45
78	Other machinery and equipment	12.96
79	Leather products	8.53
80	Rubber products	21.98
81	Plastic and related products	19.82
82	Signs, writing and marking equipment	12.69
83	Other manufacturing	15.59

Source: Industries Assistance Commission.

devaluation of the Australian dollar by almost 28 per cent over the eighteen-month period ending June 1986, the protection provided by quotas has been significantly reduced in a number of industries, and even entirely eliminated in a few.

We impose a 25 per cent across-the-board cut in the rates of protection listed in Table 1. Note that in the present debate, speculations about the magnitudes of the tariff cuts range between 20 and 25 per cent. In this paper, we have arbitrarily chosen to report our results for a 25 per cent cut. However, the reader can easily obtain the results for a 20 per cent (or any other sized) cut, if desired. Our model is solved in a linearized form and all results are reported as percentage changes in the relevant variables. Hence, the magnitude of the projected change in any given variable due to a 20 per cent cut in tariffs can easily be calculated as four-fifths of the magnitude of the reported change for that variable arising from a 25 per cent cut.

2.3 The Economic Environment

In the following sections, we report the effects of tariff cuts for two different simulations. The simulations differ only in the assumption made regarding wage indexation. In Simulation I, we assume full indexation of wages, i.e. real (CPI deflated) wages remain constant. In Simulation II, we assume zero wage indexation, i.e. nominal wages remain constant. A comparison of the results of these two simulations reveals the sources of some of the misconceptions in the arguments put forth by those opposing tariff reductions. The assumptions common to both simulations are :

(i) labour markets are slack, i.e. employment is demand-determined in every occupational category;

(ii) changes in tariffs do not affect the nominal exchange rate;

(iii) changes in tariffs do not affect the quantity of physical capital available to each industry;

(iv) changes in tariffs do not affect the level of real government consumption expenditure;

(v) changes in tariffs do not affect the composition of private absorption; both real private consumption and real private investment vary with real private disposable income; and

(vi) changes in tariffs do not affect the shares of the private and public sectors in aggregate investment; public investment varies with private investment.

Assumption (i) is descriptive of the Australian labour market in its present state, where there are high rates of unemployment and a centralized wage-fixation process which inhibits the adjustment of wages in response to changes in the demand for and supply of labour. Assumption (ii) reflects our choice of the numeraire. Under the conditions of our simulation, movements in the nominal exchange rate do not affect any real magnitudes. Instead, they translate into one-to-one movements in the absolute domestic price level. Assumption (iii) means that the results are short-run[6] and hence there is insufficient time to

change the quantity of capital stock available for use by each industry. Assumption (iv) indicates that the level of real government consumption expenditure is predetermined, and hence any changes in tariff revenues merely lead to corresponding changes in the public sector borrowing requirement (PSBR). Assumptions (v) and (vi) indicate that real private consumption, as well as real private and public investment, are endogenously determined in both simulations. Thus, both domestic absorption and the balance of trade are endogenous in both simulations. Note that this assumption has been made possible by the use of the NAGA extension, and differs from the standard one adopted when ORANI is used in stand-alone mode.

3. INTERFACING THE ORANI-NAGA MODEL WITH THE IHS DATABASE

In standard ORANI (as documented in DPSV, 1982), the demand for labour is endogenized and fully specified. It is derived as the result of a cost minimization process by the producers. Each producer is assumed to minimize unit costs of production, subject to given input prices and technological constraints. The production technology is shown in Figure 1. At the top level, intermediate inputs, primary factors, and 'other cost tickets' (miscellaneous production costs) are combined in fixed proportions to produce a given activity level.[7] At the next level, capital, labour and agricultural land (used only in agricultural industries) are combined according to CRESH technology to produce the required primary factors. Finally, at the lowest level, ten types of labour (distinguished by skill) are combined, again using CRESH technology, to produce the composite labour input.

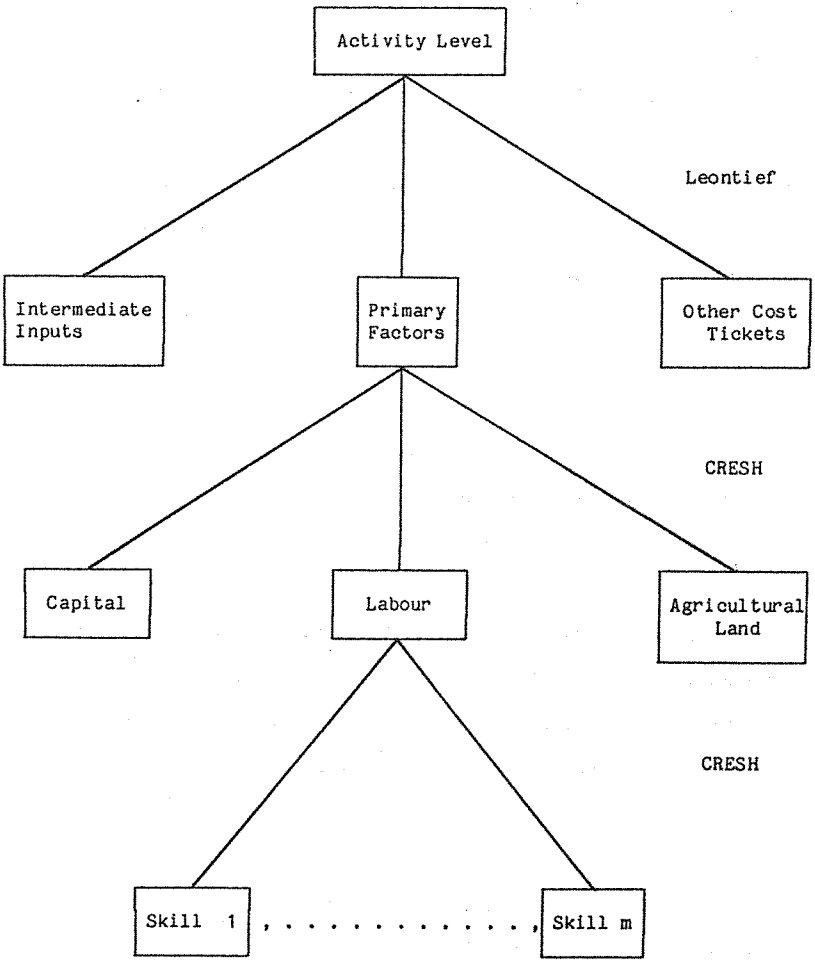

FIGURE 1 : PRODUCTION TECHNOLOGY IN ORANI

To provide a mechanism for interfacing ORANI results with the IHS database, we have made two changes in ORANI-IDM at the lowest level of the nesting in Figure 1. First, the 10-occupation classification of standard ORANI has been replaced by the 61-occupation classification in the IHS database. The required 61 occupation × 112 industry employment matrix was obtained from 1981 Census data. Second, the CRESH technology used in producing the aggregate labour input has been replaced by a fixed-coefficient (or Leontief) technology. This was necessitated by the unavailability of data on the relevant elasticities of substitution at the 61 occupation level.

Once these modifications are made, it is easy to link the different components of ORANI-IDM as follows:

(i) Suppose an economic shock alters the demand for labour by various industries. From ORANI (using the standard assumption that the shock does not cause a change in hours worked per person) we get the change in the demand for persons by each of the 112 ORANI industries.

(ii) Next, we map these to the 61 IHS occupations. It is possible that each industry in modified-ORANI uses all 61 types of labour. Hence, the change in the total number of persons employed in a particular occupation is obtained by summing the changes in the demand for persons belonging to that occupation across all 112 industries.

(iii) The numbers calculated in step (ii) are used to adjust the weight attached to each employed person in the IHS sample according to

his/her occupation. These changes are made to reflect the new allocation of jobs across industries and occupations in the post-shock economy.

4. MACRO RESULTS

Table 2 contains the results for the two simulations for a range of macro variables. These variables have been selected to shed light on three fallacies prevalent in the popular debate on protectionism:

(1) A tariff cut will seriously worsen Australia's current balance-of-payments problem by stimulating imports significantly more than exports.

(2) A tariff cut would lead to a decline in government revenues and hence to a worsening of the fiscal deficit.

(3) A tariff cut would lead to an increase in unemployment, as jobs were "exported" overseas.

The problem with all three of these propositions is that they capture only the first round or impact effects of a tariff reduction and hence represent only part of the total effect. Our results suggest that when all the second round effects set in motion by the complex inter-linkages of the economy are examined, the concerns of the protectionists are groundless.

TABLE 2

Projected Effects of a 25 per cent Across-the-Board Tariff Cut: Selected Macro Variables

	Variable	Base Year Values (1984-85)	Simulation I (Fixed real wage rate)*	Simulation II (Fixed nominal wage rate)*
1	Export receipts ($m)	34,176	1.37	0.33
2	Import expenditures ($m)	39,017	1.55	1.63
3	Balance of trade surplus ($m)	-4,841	-0.06	-0.24
4	Real private consumption ($m)	126,681	0.27	-0.02
5	Real gross domestic product ($m)	214,513	0.18	-0.27
6	Aggregate employment (persons)	6,635,901	0.25	-0.35
7	Public sector borrowing requirement ($m)	21,842	-0.01	0.19
8	Consumer price index (CPI)	100	-1.21	-0.60
9	Nominal wage rate	100	-1.21	0.00
10	Real wage rate (CPI deflated)	100	0.00	0.60

* Simulation results are expressed as percentage changes for all variables except the balance of trade surplus and the public sector borrowing requirement, which are expressed as percentages of GDP. In columns 2 and 3, the figures shown are the percentage deviations in the values of the listed variables about 2 years after the tariff change, from the values these variables would have taken at that time in the absence of the tariff change.

Let us examine the validity of each of the three arguments against trade liberalization listed above. First, for Simulation I in Table 2 we find that, as expected, import expenditures do rise substantially due to the tariff cut. However, we also find that they have a relatively minor effect on the balance of trade (BOT) deficit. While import expenditures rise by 605 million dollars, the BOT deficit increases by only 138 million dollars.[8] The reason is that the cheaper imports lead to a decline in production costs, an improvement in international competitiveness, and an increase in export revenues. As shown in Table 2, export receipts rise by 467 million dollars, thus partially off-setting the undesirable effect of increased imports on the balance of trade.

Turning to the second proposition, we find that our results for Simulation I do not substantiate it. Instead of the PSBR rising due to the tariff cut, it declines by 31 million dollars. Again, the second round effects are substantial. As a result of the expansion in the tax base, as reflected in the increase in real GDP by 343 million dollars, the decline in tariff revenues are partially offset by the increase in the tax revenue collected from other sources (personal and business taxes). In addition, certain transfer payments made by the government (such as unemployment benefits) that vary inversely with the level of economic activity, also decline due to the increase in such activity.

Finally we examine the third, and usually the most emotive, argument put forth against tariff cuts: that of the resulting job losses for domestic workers. We find that the result in Simulation I contradicts this argument. The 25 per cent across-the-board tariff reduction leads to a net <u>increase</u> of 16,900 new jobs. While workers in

some industries do lose jobs due to the increase in imports, we find that other workers gain jobs, especially in the export-producing industries. The net effect is a 0.25 per cent increase in the total number of people who have jobs.

Thus we find that, under the conditions of Simulation I, none of the expected problems eventuate. Whilst it is true that there is a marginal deterioration in the trade balance, the tariff cuts do not have a severe impact on the 'twin-deficits' (as the trade and the fiscal deficits are sometimes jointly referred to), nor do they lead to any net job losses. However, if we examine the results for Simulation II in Table 2, we find that the tariff cuts do indeed have the expected adverse outcomes. The three propositions listed above no longer appear fallacious, but are instead confirmed by our experiment. What causes this difference? As stated above, the only difference between Simulations I and II is that in the latter, real wages are no longer held constant. Instead, as the purchasing power of the consumers goes up due to the tariff cuts, as is reflected in the 0.6 per cent decline in the CPI in Table 2, real wages rise simultaneously. This increase in real wages erodes the international competitiveness of the economy, and is responsible for the adverse macro effects under Simulation II.

It is interesting to note the extent of the differences that can arise due to the change in just one assumption about the conditions in the labour market. Which of the assumptions is more valid today? It is difficult to say. The real hourly wage rate as a cost to employers has been declining over the last few years in Australia. If this climate of wage moderation persists -- at least to the extent that the tariff cuts do not lead to higher real wage costs -- then it is possible

that the tariff cuts would lead to the favourable outcome of Simulation I. If, on the other hand, wages are indexed to an expected rate of inflation that does not take the effect of tariff cuts into account and the outcomes presented for Simulation II eventuate, then it is important to realize that it is the real wage increases accompanying the tariff cuts that are responsible for these outcomes rather than the tariff cuts per se.

5. EMPLOYMENT RESULTS

As discussed in Section 3, it is the changes in the industrial composition of output and labour demand arising from the tariff cuts that lead to changes in the employment prospects of various groups. In this paper, we do not analyse the industry results since changes in the industrial composition of employment is of secondary interest here. For reference, however, we include in Appendix 1 a table of employment results for the 29 industry groups identified in the IHS.[9] Consistent with other studies, Appendix 1 reveals that the main employment loss occurs in the import-competing textile, clothing and footwear (TCF) industries and that the main gain is in the export-oriented agricultural ones.

In the following sub-sections, we present employment results for persons classified on the basis of : (1) occupation; (2) demographic characteristics; (3) country of birth; (4) area of residence; and (5) level of qualifications. All of these results are derived under the assumption that the shares of each group in total employment within an industry are not affected by the tariff cuts. In other words, we are assuming that employers do not discriminate on the

basis of any of the characteristics listed above when making hiring and firing decisions.

Since tariff cuts essentially reallocate jobs from import-competing industries to export-oriented ones, we find that the results for the two simulations considered here are qualitatively similar. Hence, in the following sections we concentrate on Simulation I results, and discuss results for Simulation II only where they differ strikingly from those for Simulation I. The main winners and losers identified in all the following tables are ranked on the basis of Simulation I results.

5.1 Employment by Occupation

Table 3 presents the highlights of the occupational results. The full set of employment results for the 61 occupations identified in the IHS are contained in Appendix 2.

Given the industry-based nature of the occupations identified in the IHS, the results in Table 3 are not difficult to interpret. The largest gainers from the tariff cuts are workers in the traditional export industries -- farming and mining. This is because the cost reductions resulting from the tariff cuts are particularly helpful to export industries which compete on world markets where selling prices are largely independent of Australian costs. In addition, we find that significant employment gains are enjoyed by millers, bakers, etc.. The reason is that almost two-thirds of this group is employed in the food, beverages and tobacco industry, the employment gains of which are well above average (0.43 per cent, see Appendix 1). One of the main reasons

TABLE 3

Projected Effects of a 25 per cent Across-the-Board Tariff Cut: Highlights of the Results for Employment by Occupation

Occupation	Employment in 1984-85 (persons)	Simulation I (Fixed real wage rate)*	Simulation II (Fixed nominal wage rate)*
MAIN GAINERS IN SIMULATION I			
1 Miners and related workers	34,835	2.02	0.28
2 Farmers, farm managers	381,990	1.46	0.08
3 Farm workers	159,817	1.23	0.03
4 Millers, bakers, etc.	108,984	0.82	0.00
5 Railway firemen and drivers	12,242	0.58	-0.05
MAIN LOSERS IN SIMULATION I			
1 Leather workers	13,441	-7.75	-8.84
2 Textile workers	22,357	-3.38	-4.35
3 Tailors, cutters, etc.	69,238	-1.59	-2.08
4 Metal workers	96,832	-0.69	-1.55
5 Rubber, plastic workers, etc.	46,674	-0.57	-1.27
Aggregate Employment	6,635,901	0.25	-0.35

* In columns 2 and 3, the figures shown are the percentage deviations in the values of the relevant variables about 2 years after the tariff change, from the values these variables would have taken at that time in the absence of the tariff change.

why this group of industries performs so well under tariff cuts is that it includes an exporting industry -- the food products industry. This industry exports processed sugar, and experiences one of the highest output and employment gains from tariff cuts (see Chapter 7, DPSV). The last group of major gainers are railway firemen and drivers. This group gains because railways are an important means of transportation for agricultural and mineral exports.

Turning next to the main losers from the tariff cuts, we find that the largest job losses are experienced by workers belonging to occupations that are concentrated in the heavily-protected TCF industries. In addition, metal workers experience higher than average job losses (of 0.69 per cent) since one-fifth of all metal workers are employed in the motor vehicles industry. Finally, rubber and plastic workers also emerge as significant losers because of their concentration in the import-competing manufacturing sector which employs 70 per cent of this group.

5.2 Employment by Demographic Group

One concern that has often been expressed about tariff cuts is that their burden will not be distributed uniformly across various demographic groups in the workforce. In particular, since females dominate the workforce in the TCF industries, it has been argued that they will bear a disproportionate share of the resulting burden of adjustment. In this section we examine the validity of this argument.

Table 4 presents the employment effects of the tariff cuts on persons classified into seven groups on the basis of demographic

TABLE 4

Projected Effects of a 25 per cent Across-the-Board Tariff Cut: Employment by Demographic Group

Demographic Group	Employment in 1984-85 (persons)	Simulation I (Fixed real wage rate)*	Simulation II (Fixed nominal wage rate)*
RELATIVE GAINERS IN SIMULATION I			
1 Senior males (age 55+)	552,926	0.36	-0.35
2 Adult males (age 25-54)	2,888,548	0.28	-0.35
RELATIVE LOSERS IN SIMULATION I			
3 Female teenagers (age 15-19)	178,558	0.18	-0.34
4 Single women (age 20+)	703,389	0.19	-0.31
5 Male teenagers (age 15-19)	224,008	0.19	-0.45
6 Young males (age 20-24)	552,134	0.22	-0.39
7 Married women (age 20+)	1,536,338	0.22	-0.34
Aggregate Employment	6,635,901	0.25	-0.35

* In columns 2 and 3, the figures shown are the percentage deviations in the values of the relevant variables about 2 years after the tariff change, from the values these variables would have taken at that time in the absence of the tariff change.

characteristics such as sex, age and marital status. It reveals that at least under the conditions of Simulation I, no group faces a net loss of jobs. The increase in aggregate employment leads to increased job opportunities for members of all groups. However, in relative terms, women do emerge as the losers; all three groups of women experience lower than average job gains under Simulation I. In comparison, the relative effects on the males depends on their age, with older males clearly benefitting the most from the tariff cuts.

An understanding of the results presented in Table 4 requires an examination of the industrial distribution of the various demographic groups listed in Table 4. Table 5 contains such a breakdown for a selection of industries. It reports the number of persons from each demographic group employed in the main gainers (agriculture and mining); in the main losers (TCF and other manufacturing); in all other industries; and in the total workforce.

With the aid of Table 5, it is easy to understand why senior and adult males emerge as the main gainers. The reason is that their employment is more concentrated in agriculture and mining, the industries in which employment expands the most. Similarly, it is also easy to understand why female teenagers and single women fare relatively badly. These two groups are more heavily concentrated in the shrinking import-competing industries than in the expanding export-oriented ones. It is interesting to compare the effect of the tariff cuts on these two groups of women with that on married women. Even though the latter constitute almost half the workforce of the now-leaner TCF industries, they emerge relatively unscathed. This is because a higher proportion of married women are employed in agriculture, as compared to

TABLE 5

Employment in 1984-85 Cross-classified by Industry and Demographic Group

Demographic Group	NUMBERS EMPLOYED IN: Agriculture (1)*	Mining (2)*	TCF (4)*	Other manufacturing (3, 5-9)*	Elsewhere (10-29)*	Total (1-29)*
	(thousands of persons)					
RELATIVE GAINERS						
1 Senior males (age 55+)	85	3	7	119	339	553
2 Adult males (age 25-54)	249	70	23	550	1,997	2,889
RELATIVE LOSERS						
3 Female teenagers (age 15-19)	1	1	5	17	155	179
4 Single women (age 20+)	14	3	15	61	610	703
5 Male teenagers (age 15-19)	21	3	2	57	141	224
6 Young males (age 20-24)	32	7	7	131	375	552
7 Married women (age 20+)	132	3	51	155	1,195	1,536
Total	534	91	111	1,090	4,810	6,636

* These numbers correspond with those in the table of industry results contained in Appendix 1.

Source: Agrawal (1988).

their single counterparts. Hence, their significant job losses in the TCF industries are partially offset by their job gains in the agricultural sector. This offsetting factor does not benefit the other groups of females to the same extent because of their lower concentration in agriculture.

One word of caution is in order. It should be recognized that even though the employment results for a group as a whole might be favourable, there might still be considerable adjustment costs imposed on individuals within that group. For example, while married women, on average, experience employment gains of 0.22 per cent under Simulation I, it is unlikely that in the short-run at least, the women who find new jobs in the agricultural industries are the same ones who lose their jobs in the TCF industries. This is because, as shown in Section 5.4 and 5.5 below, the associated relocation and/or retraining costs of such changes in employment can be quite considerable.

In Simulation II, we find that all groups experience a net decline in employment (see Table 4). Women, however, no longer bear the brunt of the burden of adjustment. Single women, who were one of the smallest gainers under Simulation I, now emerge as the smallest losers. One reason for the different outcomes under the two simulations is theirdifferential effect on the relative sizes of the public and private sectors, and hence on the employment mix. Since real government consumption expenditure is held constant in both simulations, the share of the public sector varies inversely with changes in real private consumption expenditure. Thus the public sector, relative to the private sector, contracts under Simulation I and expands under Simulation II. This is one factor that helps explain why the relative

job opportunities for single women, who are concentrated in occupations (such as nursing and teaching) that are fairly sensitive to the size of the government, contract under Simulation I and expand (relatively) under Simulation II.

5.3 Employment by Country of Birth

Another concern that has been expressed about tariff cuts is that overseas-born workers will bear a disproportionate share of the associated adjustment costs. This argument is sometimes raised as a justification for the continuation of Australia's protection of TCF and other manufacturing industries that employ large numbers of migrants. In this section we examine the validity of this argument.[10]

Table 6 contains the employment effects of tariff cuts on persons classified according to their country of birth. Only the highlights of these results are presented in the text; the full set of results for the 27 birthplaces identified in the IHS is contained in Appendix 3.

Table 6 reveals that under the conditions of Simulation I, the tariff cuts lead to improved job opportunities for several groups of workers. Of these groups, we find that Australian-born workers benefit most from the tariff reductions. Four other groups of workers also enjoy higher than average job gains: West Germans, Canadians, Indians, and Americans. The main victims of tariff cuts are workers of Vietnamese origin; while on average there are employment gains of 0.25 per cent, these workers suffer losses of 0.49 per cent. The results indicate that the employment gains of workers originating in Other

TABLE 6

Projected Effects of a 25 per cent Across-the-Board Tariff Cut: Highlights of the Results for Employment by Country of Birth

Country of Birth	Employment in 1984-85 (persons)	Simulation I (Fixed real wage rate)*	Simulation II (Fixed nominal wage rate)*
MAIN GAINERS IN SIMULATION I			
1 Australia	4,967,380	0.29	-0.32
2 West Germany	69,798	0.27	-0.37
3 Canada	6,370	0.27	-0.27
4 India	19,461	0.26	-0.34
5 U.S.A.	17,670	0.26	-0.22
MAIN LOSERS IN SIMULATION I			
1 Vietnam	15,319	-0.49	-1.18
2 Other Oceania	15,513	-0.16	-0.68
3 Greece	111,386	-0.08	-0.73
4 Other America	21,863	0.00	-0.63
5 Yugoslavia	102,729	0.04	-0.63
Aggregate Employment	6,635,901	0.25	-0.35

* In columns 2 and 3, the figures shown are the percentage deviations in the values of the relevant variables about 2 years after the tariff change, from the values these variables would have taken at that time in the absence of the tariff change.

Oceania, Greece, Other America, and Yugoslavia are also well below average.

Table 7 provides an aid for understanding the results presented in Table 6. It examines the composition of the workforce in certain industries according to the birthplace of its workers. It reveals that the reason why Australian-born workers are more favourably affected by the tariff cuts is because they dominate the agricultural workforce. Though they constitute only 74.8 per cent of the total workforce in Australia, they make-up 87.9 per cent of the agricultural workforce. Further, the numbers in Table 7 indicate that native-born Australians are less concentrated in the adversely affected manufacturing sector; they form only 50.6 per cent and 63.5 per cent of the workforce in TCF and in other manufacturing industries, respectively.

The other gainers in Table 6, i.e. the four groups of migrants who enjoy above average employment gains under Simulation I, are engaged primarily in the non-traded sectors of the economy. In particular, they are heavily concentrated in white-collar professional, technical, executive, and clerical positions. Thus, they are relatively unaffected by the reallocation of jobs within the traded sectors. They fare slightly better than the average worker due to the expansion of domestic activity under Simulation I.

Turning to the main losers, we discover that one of the largest and newest groups of migrants, those of Vietnamese origin, suffer the largest job losses due to the tariff cuts. As Table 7 reveals, a disproportionately high percentage of the workforce in the

TABLE 7

Employment in 1984-85 Cross-classified by Industry and Country of Birth

Country of Birth	NUMBERS EMPLOYED IN: Agriculture (1)*	Mining (2)*	TCF (4)*	Other manufacturing (3, 5-9)*	Elsewhere (10-29)*	Total (1-29)*
	(thousands of persons)					
MAIN GAINERS						
1 Australia	469	66	56	692	3,684	4,967
2 West Germany	5	2	2	20	41	70
3 Canada	0	0	0	0	6	6
4 India	1	0	0	2	16	19
5 U.S.A.	1	0	0	1	16	18
MAIN LOSERS						
1 Vietnam	0	0	2	9	4	15
2 Other Oceania	0	0	1	2	13	16
3 Greece	5	0	11	29	66	111
4 Other America	0	0	2	10	10	22
5 Yugoslavia	6	1	5	40	51	103
ALL OTHERS	47	22	32	284	904	1,289
Total	534	91	111	1,090	4,810	6,636

* These numbers correspond with those in the table of industry results contained in Appendix 1.

Source: Agrawal (1988).

TCF industries is made-up of Vietnam-born migrants. In fact, while all of the main losers are relatively heavily concentrated in the TCF industries, the concentration of the Vietnam-born in the TCF industries is significantly greater than of any other group. Perhaps this reflects the fact that newly-arrived migrants most frequently do tasks which are shunned by native-born Australians and more-settled migrants. It is well recognized that working conditions in parts of the TCF industries are far from ideal. Regarding the special problems of one large group in the TCF industries -- outworkers in the clothing trade -- Joe Riordan, Deputy President of the Conciliation and Arbitration Commission, is reported to have said:

> "The undisputed facts reveal the existence of widespread and grossly unfair exploitation of migrant women of non-English-speaking background who are amongst the most vulnerable persons in the workforce."
>
> (Time Australia, Special Issue on Immigration, 14 March, 1988, p. 18)

5.4 Employment by Area of Residence

In this section we present quantitative estimates of the regional reallocation of jobs due to the tariff cuts. The IHS identifies 12 areas of residence: a metropolitan and ex-metropolitan area in each of the five states excluding Tasmania; the whole state of Tasmania; and the Northern Territory (N.T.) and the Australian Capital Territory (A.C.T.) combined. Results for each of these areas is contained in Table 8.

TABLE 8

Projected Effects of a 25 per cent Across-the-Board Tariff Cut: Employment by Area of Residence

	Area of Residence	Employment in 1984-85 (persons)	Simulation I (Fixed real wage rate)*	Simulation II (Fixed nominal wage rate)*
RELATIVE GAINERS IN SIMULATION I				
	Ex-metropolitan --			
1	W.A.	184,643	0.56	-0.22
2	S.A.	171,536	0.52	-0.22
3	Victoria	530,288	0.45	-0.27
4	Queensland	554,738	0.44	-0.25
5	N.S.W.	832,962	0.38	-0.30
6	Tasmania (whole state)	180,845	0.31	-0.30
RELATIVE LOSERS IN SIMULATION I				
	Metropolitan --			
7	Victoria	1,245,786	0.08	-0.47
8	Queensland	479,269	0.17	-0.37
9	N.S.W.	1,478,644	0.18	-0.37
10	S.A.	407,890	0.18	-0.38
11	N.T. and A.C.T. (total areas)	166,662	0.21	-0.29
12	W.A.	402,639	0.22	-0.33
	Aggregate Employment	6,635,901	0.25	-0.35

* In columns 2 and 3, the figures shown are the percentage deviations in the values of the relevant variables about 2 years after the tariff change, from the values these variables would have taken at that time in the absence of the tariff change.

Table 8 reveals that in Simulation I, new job opportunities are created in every one of the twelve areas. The opposite is true for Simulation II. Regarding the relative distribution of these opportunities across the regions, all the ex-metropolitan areas gain at the expense of the metropolitan areas. This broad picture presented in Table 8 is easy to understand, given that farms and mines tend to be located in rural areas and clothing and footwear factories in urban ones. What is not immediately obvious, however, is why in Simulation I, Western Australian ex-metropolitan workers are more favourably affected than their Victorian counterparts; or why, amongst the losers, Victorian urban dwellers suffer the most in relative terms.

Table 9 provides an aid for answering questions of the type posed above. It provides a regional breakdown of the workforce in the main industries affected by the tariff cuts. It reveals that one of the main reasons why workers located in the ex-metropolitan region of W.A. emerge as the largest gainers is because they are heavily concentrated in mining. Though ex-metropolitan Western Australians constitute only 2.8 per cent of the total workforce of Australia, they make-up a staggering 25 per cent of workers in the mining industry. The reason why this group faces brighter employment prospects than their Victorian counterparts also becomes evident. Rural workers in W.A. have a relatively higher concentration in industries that are favourably affected by the tariff cuts than rural workers in Victoria; while 38.1 per cent of the former are engaged in agriculture and mining, the corresponding proportion for the latter is only 24.1 per cent.

Under Simulation I, we find that the tariff cuts are least beneficial for urban Victorians. Compared with the national average

TABLE 9

Employment in 1984-85 Cross-classified by Industry and Area of Residence

	NUMBERS EMPLOYED IN					
	Agri-culture	Mining	TCF	Other manufac-turing	Else-where	Total
	(1)*	(2)*	(4)*	(3, 5-9)*	(10-29)*	(1-29)*
Area of Residence	(thousands of persons)					
RELATIVE GAINERS						
Ex-metropolitan --						
1 W.A.	46	23	1	12	103	185
2 S.A.	47	0	0	28	97	172
3 Victoria	125	1	13	67	324	530
4 Queensland	105	14	1	61	374	555
5 N.S.W.	140	27	10	116	540	833
6 Tasmania (whole state)	17	3	1	26	134	181
RELATIVE LOSERS						
Metropolitan --						
7 Victoria	13	6	50	276	901	1,246
8 Queensland	6	3	4	74	392	479
9 N.S.W.	18	5	23	278	1,155	1,479
10 S.A.	8	2	6	83	309	408
11 N.T. and A.C.T. (total areas)	1	1	0	8	157	167
12 W.A.	9	5	3	61	325	403
Total	534	91	111	1,090	4,810	6,636

* These numbers correspond with those in the table of industry results contained in Appendix 1.

Source: Agrawal (1988).

gain of 0.25 per cent, these workers experience employment gains of only 0.08 per cent. This is because of the heavy concentration of TCF manufacturing establishments in urban Victoria. Nearly half of the total TCF workforce is located in this region (see Table 9).

Residents of W.A. emerge as the unambiguous beneficiaries of the tariff cuts -- while the ex-metropolitan workers of this state enjoy the largest absolute gains in employment, its metropolitan workers enjoy only slightly smaller gains than the national average.

5.5 Employment by Highest Qualification

In this sub-section, we examine the effects of tariff cuts on persons differentiated by their qualifications. Our aim is to compare the skill requirements of expanding industries with those of contracting ones, and to ascertain the types of workers required in the post-reform economy.

Table 10 presents results for seven groups of persons classified on the basis of their highest qualification. It reveals that under Simulation I, workers in only one of these seven groups, consisting of those with no schooling, experience a net decline in their employment opportunities. Included in the three groups with above average gains is a residual category defined as 'all others' which includes persons who list adult education or a hobby course as their highest qualification.

Table 11 is included as an aid to understanding the results contained in Table 10. As before, we use it to get an idea of the

TABLE 10

Projected Effects of a 25 per cent Across-the-Board Tariff Cut: Employment by Highest Qualification

	Highest Qualification	Employment in 1984-85 (persons)	Simulation I (Fixed real wage rate)*	Simulation II (Fixed nominal wage rate)*
RELATIVE GAINERS IN SIMULATION I				
1	No qualifications since school	3,622,135	0.30	-0.35
2	All others	106,670	0.30	-0.32
3	Certificate/diploma	1,137,312	0.26	-0.26
RELATIVE LOSERS IN SIMULATION I				
4	Never went to school	13,099	-0.08	-0.80
5	Trade qualifications	1,250,516	0.15	-0.46
6	Higher qualifications (than category 7)	66,530	0.19	-0.19
7	Bachelor degree/ post-graduate diploma	439,639	0.20	-0.24
	Aggregate Employment	6,635,901	0.25	-0.35

* In columns 2 and 3, the figures shown are the percentage deviations in the values of the relevant variables about 2 years after the tariff change, from the values these variables would have taken at that time in the absence of the tariff change.

TABLE 11

Employment in 1984-85 Cross-classified by Industry and Highest Qualification

Highest Qualification	NUMBERS EMPLOYED IN: Agriculture (1)*	Mining (2)*	TCF (4)*	Other manufacturing (3, 5-9)*	Elsewhere (10-29)*	Total (1-29)*
	(thousands of persons)					
RELATIVE GAINERS						
1 No qualifications since school	408	45	75	587	2,507	3,622
2 All others	11	0	1	15	80	107
3 Certificate/ diploma	63	15	9	122	928	1,137
RELATIVE LOSERS						
4 Never went to school	2	0	1	3	7	13
5 Trade qualifications	38	24	22	322	845	1,251
6 Higher qualifications (than category 7)	2	1	0	2	62	67
7 Bachelor degree/ post-graduate diploma	10	6	1	39	384	440
Total	534	91	111	1,090	4,810	6,636

* These numbers correspond with those in the table of industry results contained in Appendix 1.

Source: Agrawal (1988).

industrial distribution of the groups identified in Table 10. It helps explain why persons with no post-school qualifications emerge as the largest gainers from the tariff cuts. It is because, of all groups, this one is the most heavily concentrated in agriculture. Though persons with no post-school qualifications make up only 54.4 per cent of the total workforce, they account for a significantly higher 76.5 per cent of the agricultural workforce.

The groups that emerge as relative losers under Simulation I can be divided into two categories:

(i) those that are heavily concentrated in the protected manufacturing industries; and

(ii) those that are heavily concentrated in the government-funded industries.

Group (i) consists of the tiny minority of workers that never had any schooling (0.2 per cent of the workforce) and of blue-collar tradespersons. The reasons for their loss are evident from Table 11.

Group (ii) consists of those with a bachelor's degree or more. Our database reveals that 80 per cent of the most highly qualified people in the workforce (i.e., those belonging to category 6 in Tables 10 and 11) are employed in just four of the 29 industries identified in Appendix 1. These are (i) public administration and defence (12.2 per cent); (ii) health and veterinary services (21.9 per cent); (iii) education, museums, and library services (38.6 per cent); and (iv) other community services (7.3 per cent). Because of their heavy concentration

in these government-funded industries, the employment prospects of highly qualified workers are closely tied to the fate of the public sector. As explained in Section 5.2, the share of the public sector in total output contracts under Simulation I and expands under Simulation II. This helps explain why highly qualified workers fare worse than the average worker under Simulation I and far better than the average under Simulation II.

6. CONCLUSION

This paper examines how different groups of workers are affected by a reduction in tariffs. It finds that workers who are concentrated in the export-oriented sector will gain jobs at the expense of others who are concentrated in the import-competing ones. Whether the tariff cuts lead to a net increase or decrease in jobs, however, depends on the assumptions made about the state of the labour market. In particular, under the assumption that real wages remain unaffected by the tariff cuts, we find that most groups of workers enjoy improved employment opportunities as a result of trade liberalization. It should be kept in mind though, that individuals in some occupations and regions may be subject to significant pressures to relocate and/or retrain.

One interesting feature of the results presented in this paper has important policy implications. In the past two years, Australia has suffered a sharp decline in its terms of trade. In a recent paper, Agrawal and Meagher (1987) examined the distributional implications of this decline. Comparing that study with the current one, we find that the groups that will be adversely affected by trade liberalization are the same groups who have been favourably affected by the recent terms of

trade decline. This is because the two shocks under consideration reallocate resources in opposite directions. Thus, while tariff cuts reallocate jobs from the import-competing sector to the export-producing one, the terms of trade decline does the opposite. The policy implication is that if ever there was an opportune time to implement a tariff reform, it is now. The current economic climate creates the scope to improve economic efficiency without requiring a disruptively large reconfiguration of the workforce.

APPENDIX 1

Projected Effects of a 25 per cent Across-the-Board Tariff Cut: Employment by Industry

	Industry	Employment in 1984-85 (persons)	Simulation I (Fixed real wage rate)*	Simulation II (Fixed nominal wage rate)*
1	Agriculture, forestry, fishing and hunting	533,891	1.30	0.04
2	Mining	90,913	0.75	-0.23
3	Food, beverages, tobacco	189,171	0.43	-0.25
4	Textile, clothing, footwear	110,504	-1.78	-2.43
5	Paper, wood, printing, publishing	194,195	0.07	-0.50
6	Chemicals, petroleum, coal and non-metallic mineral products	113,842	0.12	-0.53
7	Metal products	226,378	0.06	-0.60
8	Transport and other equipment	303,512	-0.05	-0.70
9	Other manufacturing	62,309	-0.35	-0.99
10	Electricity, gas, and water	156,915	0.17	-0.46
11	Construction - general	225,862	0.22	-0.35
12	Construction - special trades	268,628	0.18	-0.37
13	Wholesale trade	375,970	0.21	-0.36
14	Retail trade - stores	286,968	0.18	-0.32
15	Retail trade - dealers in motor vehicles	190,348	0.14	-0.44
16	Retail trade - other	351,859	0.35	-0.16

...continued

APPENDIX 1 (continued)

	Industry	Employment in 1984-85 (persons)	Simulation I (Fixed real wage rate)*	Simulation II (Fixed nominal wage rate)*
17	Road transport	158,149	0.27	-0.28
18	Other transport	217,513	0.23	-0.36
19	Communication	153,491	0.25	-0.35
20	Finance, investment	166,495	0.21	-0.32
21	Insurance and insurance services	74,664	0.23	-0.33
22	Property and business services	273,015	0.19	-0.35
23	Public administration and defence	418,485	0.18	-0.27
24	Health and veterinary services	416,465	0.22	-0.22
25	Education, museums, library services	392,444	0.10	-0.13
26	Other community services	190,587	0.18	-0.32
27	Entertainment, recreation	76,161	0.30	-0.27
28	Restaurants, hotels, clubs	220,793	0.33	-0.25
29	Personal services	86,166	0.34	-0.38
	Aggregate Employment	6,635,901	0.25	-0.35

* In columns 2 and 3, the figures shown are the percentage deviations in the values of the relevant variables about 2 years after the tariff change, from the values these variables would have taken at that time in the absence of the tariff change.

APPENDIX 2

Projected Effects of a 25 per cent Across-the-Board Tariff Cut:
Employment by Occupation

	Occupation	Employment in 1984-85 (persons)	Simulation I (Fixed real wage rate)*	Simulation II (Fixed nominal wage rate)*
1	Architects, engineers, etc.	62,172	0.22	-0.43
2	Physical scientists	15,851	0.27	-0.33
3	Medical practitioners, dentists	35,656	0.22	-0.16
4	Nurses	150,911	0.22	-0.16
5	Medical workers n.e.c.	29,558	0.28	-0.10
6	Teachers	271,213	0.04	-0.04
7	Law professionals	16,874	0.26	-0.35
8	Artists, entertainers, etc.	43,945	0.25	-0.25
9	Draftsmen, technicians n.e.c.	113,718	0.15	-0.42
10	Other professional workers	143,273	0.14	-0.34
11	Administrative, executive	20,271	0.15	-0.08
12	Employers, directors n.e.c.	345,921	0.21	-0.37
13	Book-keepers, cashiers	110,123	0.26	-0.30
14	Stenographers, typists	99,839	0.18	-0.31
15	Other clerical workers	912,876	0.20	-0.32
16	Insurance, real estate	43,831	0.33	-0.34
17	Commercial travellers	53,897	0.17	-0.49
18	Proprietors, shopkeepers	523,338	0.36	-0.07
19	Farmers, farm managers	381,990	1.46	0.08
20	Farm workers	159,817	1.23	0.03
21	Other rural workers	21,121	0.16	-0.24
22	Miners and related workers	34,835	2.02	0.28
23	Pilots, navigators, etc.	8,171	0.53	-0.13
24	Railway firemen and drivers	12,242	0.58	-0.05
25	Postmasters	3,887	0.35	-0.35
26	Postmen and messengers	28,402	0.33	-0.34
27	Road drivers	197,709	0.33	-0.21
28	Railway guards, conductors	4,676	0.45	-0.06
29	Stationmasters, etc.	4,336	0.43	-0.08
30	Other railway workers	18,813	0.43	-0.14
31	Telecommunication workers	25,455	0.28	-0.35
32	Transport, communication n.e.c.	17,961	0.42	-0.09
33	Textile workers	22,357	-3.38	-4.35
34	Tailors, cutters, etc.	69,238	-1.59	-2.08
35	Leather workers	13,441	-7.75	-8.84

...continued

APPENDIX 2 (continued)

	Occupation	Employment in 1984-85 (persons)	Simulation I (Fixed real wage rate)*	Simulation II (Fixed nominal wage rate)*
36	Furnacemen, etc.	15,811	0.10	-0.88
37	Watchmakers, jewellers	24,580	0.14	-0.48
38	Mechanics, plumbers, etc.	467,506	0.02	-0.65
39	Electricians, etc.	167,325	0.28	-0.37
40	Metal workers	96,832	-0.69	-1.55
41	Carpenters, etc.	140,003	0.14	-0.38
42	Painters, decorators	54,987	0.14	-0.36
43	Bricklayers, etc.	147,889	0.31	-0.12
44	Compositors, etc.	43,983	0.09	-0.47
45	Millers, bakers, etc.	108,984	0.82	0.00
46	Tobacco workers, etc.	34,975	-0.05	-0.86
47	Rubber, plastic workers, etc.	46,674	-0.57	-1.27
48	Packers, wrappers, labellers	30,710	0.08	-0.64
49	Lifting equipment operators	85,181	0.27	-0.40
50	Storemen, freight handlers	135,288	0.07	-0.56
51	Labourers n.e.c.	243,054	0.11	-0.51
52	Protective services workers	60,240	0.19	-0.19
53	Housekeepers, cooks, etc.	190,999	0.30	-0.22
54	Waiters, bartenders	93,174	0.37	-0.24
55	Caretakers, cleaners	104,036	0.19	-0.30
56	Barbers, beauticians	36,089	0.43	-0.33
57	Launderers, etc.	16,914	0.03	-0.58
58	Athletes, undertakers	8,976	0.35	-0.22
59	Photographers	5,943	0.32	-0.31
60	Service workers n.e.c.	76,312	0.25	-0.17
61	Members of armed services	71,512	0.00	0.00
	Aggregate Employment	6,635,901	0.25	-0.35

* In columns 2 and 3, the figures shown are the percentage deviations in the values of the relevant variables about 2 years after the tariff change, from the values these variables would have taken at that time in the absence of the tariff change.

APPENDIX 3

Projected Effects of a 25 per cent Across-the-Board Tariff Cut: Employment by Country of Birth

	Country of Birth	Employment in 1984-85 (persons)	Simulation I (Fixed real wage rate)*	Simulation II (Fixed nominal wage rate)*
1	Australia	4,967,380	0.29	-0.32
2	United Kingdom	628,778	0.21	-0.36
3	Italy	163,627	0.20	-0.47
4	Greece	111,386	-0.08	-0.73
5	Yugoslavia	102,729	0.04	-0.63
6	Netherlands	57,509	0.19	-0.42
7	West Germany	69,798	0.27	-0.37
8	Austria	16,629	0.12	-0.45
9	Czechoslovakia	10,231	0.13	-0.50
10	Hungary	19,865	0.05	-0.59
11	Malta	33,614	0.13	-0.49
12	Poland	27,158	0.13	-0.48
13	Other Europe	82,310	0.12	-0.49
14	China (excluding Taiwan)	16,441	0.24	-0.29
15	India	19,461	0.26	-0.34
16	Lebanon	20,495	0.10	-0.56
17	Malaysia	14,980	0.17	-0.30
18	Vietnam	15,319	-0.49	-1.18
19	Other Asia	85,986	0.04	-0.50
20	United States of America	17,670	0.26	-0.22
21	Canada	6,370	0.27	-0.27
22	Other America	21,863	0.00	-0.63
23	Egypt	14,478	0.18	-0.42
24	South Africa	13,120	0.16	-0.34
25	Other Africa	11,696	0.25	-0.33
26	New Zealand	71,493	0.22	-0.35
27	Other Oceania	15,513	-0.16	-0.68
	Aggregate Employment	6,635,901	0.25	-0.35

* In columns 2 and 3, the figures shown are the percentage deviations in the values of the relevant variables about 2 years after the tariff change, from the values these variables would have taken at that time in the absence of the tariff change.

ENDNOTES

1. These include: Dixon, Parmenter, Sutton and Vincent (1982); Dixon, Parmenter and Rimmer (1984); and Higgs (1986).

2. ORANI is a well-known general equilibrium model of the Australian economy and is comprehensively documented in Dixon, Parmenter, Sutton and Vincent (henceforth DPSV) (1982). Powell and Lawson (1986) provide a review of the many policy applications of ORANI.

3. See Meagher and Agrawal (1986); Agrawal and Meagher (1987a); and Agrawal, Meagher and Parsell (1987).

4. The equations of the ORANI model are solved using the GEMPACK general purpose software system for CGE models (Pearson, 1986). The process of solving the linear equations used the Harwell sparse matrix code (Duff, 1977). NAGA is solved using the procedure documented in Agrawal and Meagher (1987b).

5. The updating procedure is described fully in Agrawal and Meagher (1988).

6. The duration of the ORANI short-run has been estimated to be about two years (Cooper, McLaren and Powell, 1985).

7. Note that inputs are regarded as non-specific to products. Inputs merely generate a general capacity to produce which can be used to produce a variety of products. The optimal product-mix is derived through a revenue-maximization procedure.

8. ORANI users will notice that the result reported here for the direction of change in the trade balance under Simulation I is the opposite of that reported for the same simulation conducted using ORANI in stand-alone mode (see DPSV, 1982). The difference arises because using ORANI-NAGA, we have endogenized domestic absorption, which increases as a result of the tariff cut and leads to further increases in imports.

9. The mapping between the 29 IHS industries and the 112 ORANI industries is provided in Agrawal (1988).

10. This issue has been examined in an earlier study by Cook and Dixon (1981). Their study is based on data from the 1976 Census, and distinguishes 11 countries of birth.

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