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**TARIFF REFORM AND THE DISTRIBUTION
OF EMPLOYMENT**

by

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INDUSTRIES ASSISTANCE COMMISSION

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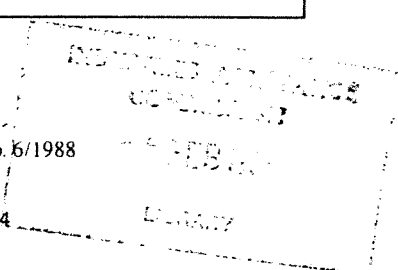
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TARIFF REFORM AND THE DISTRIBUTION
OF EMPLOYMENT

by
Nisha Agrawal and G.A. Meagher*

I. INTRODUCTION

Since the mid-1980's, the burgeoning foreign debt has emerged as a major problem confronting Australia's economic policy makers. During the period 1982 to 1986, the foreign debt as a percentage of GDP rose from 12 per cent to 31 per cent.

The initial response of the Federal Government was twofold. It reduced the rate of growth of its own spending, bringing down a budget for 1987/88 that was balanced to all intents and purposes. Secondly, it pursued a wages policy, via its accord with the trade union movement, that produced a 6 per cent fall in real wages between 1983 and 1987. However, following its reelection in July 1987, the Government signalled that the focus of the policy response would now shift from the macro to the micro economy.

Speaking at the 16th Conference of Economists at Surfers Paradise in August, the Prime Minister, Mr Hawke, identified six broad areas as deserving of early attention: transport, communications, public enterprises, education, industrial relations and industry assistance. With respect to the last of these, he went on:

"... 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 industry to stand on its own two feet after a period of adjustment." (Hawke, 1987, p. 106)

Given these developments, it is timely to review the economic effects of a reduction in tariff protection, and particularly the effects of such a reduction on the distribution of employment.

Tariffs enhance profits and employment in protected industries in a direct and transparent manner. This effect of tariffs is widely understood in the community and is responsible for the numerous lobby groups who argue vigorously for their introduction or their retention. Other groups are adversely affected, but the mechanisms involved are more complex and can require quite sophisticated economic analysis for their delineation. In Australia, the quality of the information available about protection policy has been significantly advanced by the development of the ORANI model and its subsequent adoption as a standard tool of analysis by the Industries Assistance Commission.¹ As far as the distribution of employment is concerned, the ORANI model itself provides projections for 112 industries and 10 skill-based occupations. However, results for groups differentiated by a number of other demographic and social characteristics have been generated by supplementing the model with data from the 1976 Census of Population and Housing.²

In this paper we present some more up-to-date results in this tradition. We consider the short-run consequences of a 25 per cent cut in tariff protection on employment by industry, by occupation, and by a selection of social characteristics (age, sex, marital status, place of birth, area of residence and highest educational qualification). Our analysis employs an extended version of the ORANI model, but relies on unit record data from the 1981-82 Income and Housing Survey (IHS), as well as the 1981 Census, as sources of supplementary data. Hence, compared with the earlier studies, our results reflect the changes that occurred in the composition of employment during the period 1976 to 1981-82.

The remainder of the paper is organized into three sections. Section II provides further detail about our model and about the economic environment in which the tariff cut is assumed to occur. Section III presents and analyses our results. Section IV summarizes the main features of the analysis and draws the appropriate conclusions.

II. SPECIFICATION OF THE SIMULATIONS

II.1 The Model

The results reported in this paper are generated via a three step procedure, the first of which is to solve the ORANI-NACA model of the Australian economy.³ The theoretical structure of the ORANI model is fully described in Dixon et al. (1982). With the exception of ad valorem tariff rates (see below), our ORANI computations employ the 1977/78 database set out in Blampied (1985). The main purpose of the NACA extension to ORANI is to incorporate the National and Government

Accounts set out in Table 1. The 1984/85 values of the accounts shown in the table comprise the database for the NAGA model. Details of its theoretical specification are contained in Meagher and Parmenter (1985 and 1987).

The solution of the ORANI-NAGA model determines the effects of the tariff reduction on a wide range of macro and structural variables of the economy, including employment changes in each of the 112 ORANI industries. The second step of the procedure consists of converting these changes in employment by industry (measured in efficiency units) to changes in employment by occupation (measured in persons). The conversion, which identifies 61 occupational groups, assumes that the average number of efficiency units of labour supplied by each employed person and the occupational composition of the labour force employed in each industry both remain constant when tariffs are cut. Data for the conversion is derived from the 1981 Census of Population and Housing.

Under this arrangement, the determination of employment by occupation in the model can be summarized as follows. Given factor prices and the level of activity in an industry, producers choose inputs to minimize their costs subject to constraints imposed by the production technology illustrated in Figure 1. At the top level of the hierarchy, they combine intermediate inputs and "other cost tickets" (miscellaneous production costs) with an effective primary factor in fixed proportions, i.e., according to a Leontief production function. At the middle level, they form units of the effective primary factor by combining capital and agricultural land (where relevant) with an effective labour input according to a CRESH production function. At the bottom level, they form units of the effective labour input by combining labour from each

Table 1. National and Government Accounts, 1984-85, \$million

Description	Value
Composition of GDP as income -	
1 Disposable labour income	85856
2 PAYE taxes (net)	27224
3 Payroll taxes	2424
4 Cost of employing labour (sum:1+2+3)	112074
5 Disposable capitalist income	16765
6 Taxes on profits and self employment	11903
7 Gross operating surplus (sum:5+6)	78688
8 Commodity taxes less subsidies	13793
9 Other indirect taxes	9008
10 Non-labour income (sum:7+8+9)	101489
11 Gross domestic product (sum:4+10)	214513
Composition of GDP as expenditure -	
12 Private consumption	126681
13 Government consumption	41042
14 Private investment	34186
15 Government investment	17445
16 Domestic absorption (sum:12+13+14+15)	219354
17 Exports	34176
18 Imports	39017
19 Balance of trade surplus (difference:17-18)	-4841
20 Gross domestic product (sum:16+19)	214513
Composition of Government income -	
21 Taxes on income (sum:2+6)	35327
22 Payroll taxes	3644
23 Commodity taxes	17263
24 Other indirect taxes	9008
25 Other government income	6388
26 Government income (sum:21+22+23+24+25)	71630
Composition of government outlays -	
27 Government consumption	41042
28 Government investment	17445
29 Government expenditure (sum:27+28)	58487
30 Unemployment benefits	12384
31 Other transfers to persons	13296
32 Other outlays	13605
33 Government outlays (sum:29+30+31+32)	93872
Other categories -	
34 Public sector borrowing requirement (difference:33-26)	21842
35 Net government income (difference:29-34)	3645
36 Nominal disposable income (total:1+5+8-23-25+30+31+32)	177868

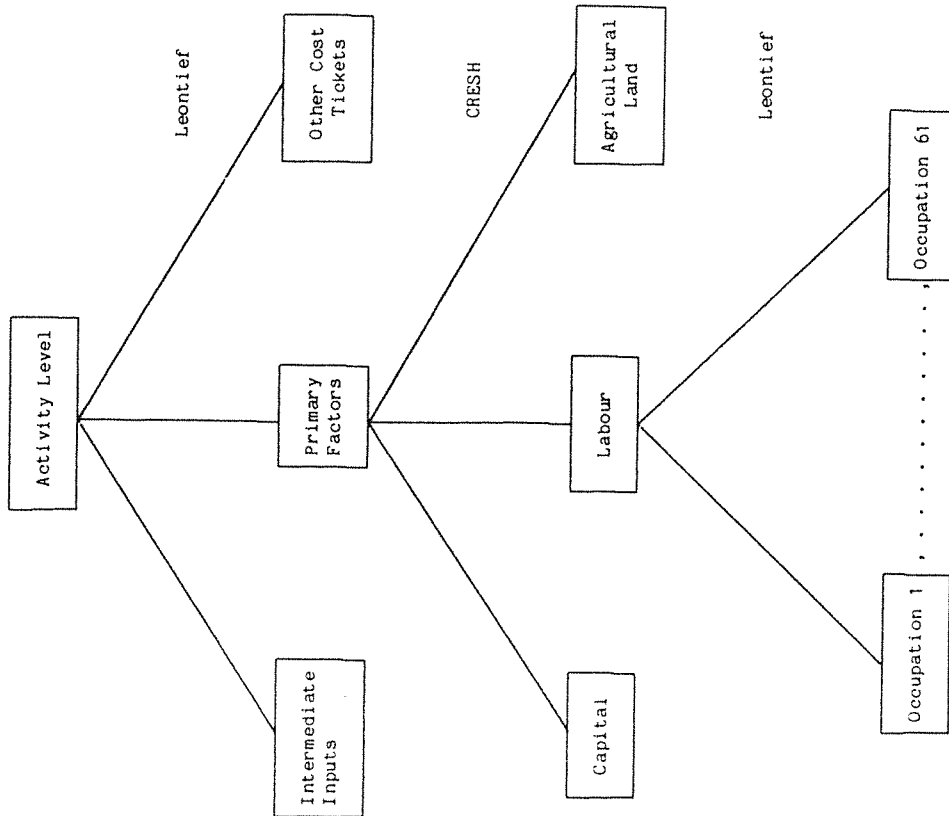


FIGURE 1: PRODUCTION TECHNOLOGY

of the 61 occupations in fixed proportions. Total employment for a particular occupation is then obtained by summing across industries. Apart from the wage rates, all factor prices and industry activity levels are themselves endogenous variables of the model.*

The third step of the computational procedure utilizes unit record data from the 1981-82 IHS to generate changes in employment by various social characteristics.* For each person included in the IHS sample, the data includes a weight indicating the number of persons in the population that he or she represents.* If employment for a particular occupation is calculated to increase by x per cent at step two, the population weights of all employed persons in the IHS sample with that occupation are increased by x per cent at step three. A comparison of employment levels in the revised (post-shock) unit records with those in the original (pre-shock) records then reveals the desired changes in employment by social characteristic. The method assumes that the social composition of employed workers in each occupation remains constant.

II.2 The Tariff Cut

In our simulations, we assume that the government imposes a 25 per cent across-the-board cut in the ad valorem rates of protection on manufactured commodities shown in Table 3 (see section III.2, below).⁷ These rates are estimates supplied by the Industries Assistance Commission of the extent to which tariff and quota protection raised the domestic prices of imported goods in 1986-87. Two of the most highly protected groups of industries in Australia, i.e., the textile, clothing and footwear (TCF) and passenger motor vehicles (PMV) industries, are

protected by quotas. However, because of a series of devaluations of the Australian dollar, the protection afforded by quotas was substantially reduced during 1985-86, and the rates in Table 3 reflect mainly tariff protection (see Fallon and Thompson, 1987). Note that, although the magnitude we have chosen for the cut is arbitrary, the model is linear in percentage changes of its variables, and the effects of an across-the-board cut of some other magnitude can be simply obtained by taking the appropriate multiple of the reported results.

II.3 The Economic Environment

Three aspects of the economic environment assumed to prevail when the tariff reform is imposed should be borne in mind when assessing our results. The first concerns the level and composition of real domestic absorption. Real private absorption and both its components (i.e., private consumption and private investment) vary with real private sector disposable income. Apart from tariff rates, all rates of direct and indirect taxation are held constant, as is the level of real government consumption (the "fiscal assumption" in later usage). Government investment varies with private investment. Once these relationships have been satisfied, any outstanding changes in national income induced by the tariff cut appear as changes in the balance of trade.

The second aspect concerns the operation of primary factor markets. In the labour market, we take wage rates as given and assume that, in each occupation, labour is in excess supply at these rates. This treatment is in accord with the centralized nature of the wage fixation process and the high levels of unemployment that have

characterized the Australian market in recent years. It implies that any induced changes in the demand for labour appear only as changes in employment. Since the tariff cut affects the consumer price index (CPI), a pivotal variable for wage determination, a scenario must be specified to describe the response of the nominal wage rate. In the spirit of sensitivity analysis, we present results for two scenarios, one representing "real wage maintenance" (i.e., no change in the CPI-deflated real wage rate) and the other representing "full wage discounting" (i.e., no change in the nominal wage rate).

In other factor markets, industry-specific physical capital and land (where appropriate) are assumed to be fixed, with rental rates adjusting to ensure that these factors remain fully employed. In this sense, our simulations should be considered to be short-run.⁹

The third central aspect of the economic environment concerns the exchange rate. We assume that the nominal exchange rate is fixed (the unit of foreign exchange is the numeraire for our model), and that induced changes in the real exchange rate appear as changes in the domestic price level.⁹ This should not be taken to imply that our results are relevant only to a world of fixed exchange rates; rather, they are relevant to a world in which the real exchange rate is determined independently of the nominal exchange rate.¹⁰

III. RESULTS

III.1 Macro Results

Table 2 contains projections of the effects of the tariff cut on a number of key macro variables of the ORANI-NAGA model. As an example of the interpretation of these projections, consider the value -1.21 for the consumer price index in Simulation I (row 8, column 1). The projection maintains that, about two years after the introduction of the tariff reform, the CPI will be 1.21 per cent lower than it would have been in the absence of the reform.

The impact effect of the tariff cut is to make imports cheaper relative to domestically-produced import-competing goods, leading to an increase in imports, a reduction in tariff revenue and a reduction in output and employment in the import-competing sector. Thus, as a result of the impact effect, the balance of trade tends to deteriorate, the public sector borrowing requirement (PSBR) tends to increase, and aggregate employment tends to fall.

However, the tariff cut also lowers domestic costs via reductions in the domestic prices of imported inputs to production. Hence it induces an improvement in the competitiveness of the export sector. When the real wage rate is fixed in terms of the CPI, as in Simulation I, this improvement is considerably enhanced by a reduction in the nominal wage rate. The CPI falls (inter alia) because the tariff cut reduces the domestic prices of imported consumption goods. On the other hand, the foreign prices of export goods are not directly affected.

Table 2. Projected Effects of a 25 per cent Tariff Cut : Selected Macro Variables

Variable	Simulation I (Fixed real wage rate)	Simulation II (Fixed nominal wage rate)
1 Export receipts	1.37	0.33
2 Import expenditures	1.55	1.63
3 Balance of trade surplus	-0.06	-0.24
4 Real private consumption	0.27	-0.02
5 Real gross domestic product	0.18	-0.27
6 Aggregate employment	0.25	-0.35
7 Public sector borrowing requirement	-0.01	0.19
8 Consumer price index (CPI)	-1.21	-0.60
9 Nominal wage rate	-1.21	-0.18
10 Real wage rate	-1.21	0.00
11 Real wage rate (CPI deflated)	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.

Hence, if the nominal wage rate falls in line with the CPI, the real wage rate remains unchanged from a worker's point of view but declines from the point of view of an exporter. The induced effect of the tariff cut, therefore, is to lower domestic prices, increase exports and increase output and employment in the export sector.

The projections in Table 2 represent the total effect of the tariff cut. In Simulation I, the increase in import expenditure due to the impact effect is roughly equal to the increase in export receipts due to the induced effect, with a net deterioration in the balance of trade of 0.06 per cent of gross domestic product (GDP). In terms of employment, the induced effect is slightly stronger, with aggregate employment increasing by 0.25 per cent. The induced fall of 1.20 per cent in the government price index (GPI) reduces the expenditure side of government's budget by about the same amount as the reduction in tariff revenue, with a net reduction in the PSBR of 0.01 per cent of GDP. In 1984-85, GDP was about \$215 billion (see Table 1) and aggregate

employment was about 6636 thousand persons. Taking 1984-85 as the base year, Simulation I projects that the tariff cut will increase the balance of trade deficit by \$138 million, reduce the government's budget deficit by \$31 million and increase employment by 16,900 jobs.

In Simulation II, the nominal wage rate is assumed to remain constant and the magnitude of the induced effect is correspondingly reduced. The increase in export receipts is only a quarter of the increase in Simulation I, and the balance of trade deteriorates by 0.24 per cent of GDP (\$521 million). Aggregate employment is now influenced more by the impact effect than the induced effect, and falls by 0.35 per cent of GDP (23,200 jobs). As the commodities purchased by the government tend to be very labour intensive, the GPI is particularly sensitive to changes in the nominal wage rate. In Simulation II, the GPI falls by only 0.18 per cent, as compared with 0.60 per cent for the CPI. Hence the income side of the government's budget now declines more quickly than the expenditure side, and the PSBR increases by 0.19 per cent of GDP (\$412 million).

III.2 Employment by Industry

In Table 3 we present our projections for employment by industry, together with some supplementary information to assist in their interpretation. The table contains six columns and 112 rows, each row representing one of the industries identified in the ORANI model. For Simulation I, the employment projection for an industry, expressed as a percentage change, appears in the third column. The adjacent (fourth) column shows the position assumed by the industry in a ranking that runs from the industry with the largest employment gain (position

Table 3. Projected Effects of a 25 per cent Tariff Cut - Employment by Industry*

Industry	Base Period Tariff Rate	Trade Category	Simulation I		Simulation II	
			Proj- action	Rank	Proj- action	Rank
1 Pastoral zone		E	1.46	12	0.05	15
2 Wheat-sheep zone		E	1.55	11	0.15	13
3 High-sheep zone		E	1.23	16	0.16	12
4 North-east beef		ER	3.31	10	0.46	5
5 Milk, beef and pigs		ER	3.71	7	-0.05	38
6 Other farming - export		ER	2.36	17	0.33	38
7 Other farming - import competing		WT	0.57	20	-0.22	47
8 Poultry farming		ER	1.35	13	0.17	11
9 Agricultural services		ER	0.85	16	0.04	18
10 Forestry and logging		WT	-0.60	94	-0.54	76
11 Fishing and hunting		E	0.55	21	0.02	19
12 Ferrous metal ores		E	2.33	8	0.50	3
13 Non-ferrous metal ores		E	2.33	6	0.38	6
14 Black coal		E	2.88	4	0.49	4
15 Oil, gas and brown coal		WT	1.56	15	-0.36	15
16 Other minerals		TC	0.55	22	-0.35	66
17 Services to mining n.e.c.		ER	1.52	20	0.29	10
18 Meat products	25.26	E	1.82	9	0.24	8
19 Milk products	11.20	WT	-0.15	78	0.24	46
20 Fruit and vegetable products		WT	0.03	74	-0.25	51
21 Margarine, oils and fats n.e.c.	6.75	TC	0.07	69	-0.45	72
22 Flour mill and cereal food products	8.30	WT	0.25	54	-0.13	38
23 Bread, cakes and biscuits	0.46	WT	-0.27	70	-0.04	24
24 Confectionery and cocoa products	15.75	TC	-0.61	81	-0.69	52
25 Other food products	10.15	E	3.88	2	0.69	2
26 Soft drinks, cordials and syrups	10.58	WT	0.99	68	-0.29	56
27 Beer and malt	30.68	WT	0.37	41	-0.15	40
28 Other alcoholic beverages	29.87	TC	-1.15	101	-2.27	103
29 Tobacco products	2.25	TC	0.17	61	-0.09	32
30 Cotton ginning, wool scouring, etc.	2.13	E	0.69	18	-0.85	83
31 Man-made fibres, yarns, etc.	30.63	TC	-7.90	111	-9.90	111
32 Cotton yarns, broadwoven fabrics, etc.	28.57	TC	-7.60	110	-7.60	110
33 Worsted and woollen yarns, etc.	12.19	TC	-1.45	103	-2.06	102
34 Textile finishing	36.20	TC	-1.31	102	-1.81	97
35 Textile floor coverings, felt, etc.	33.67	TC	-1.53	104	-2.39	104
36 Other textile products	18.94	TC	-0.41	91	-1.17	94
37 Knitting mills	63.04	TC	-2.81	107	-3.27	107
38 Clothing	64.03	TC	-2.26	106	-2.68	105
39 Footwear	63.53	TC	-10.72	112	-12.02	112
40 Sawmill products	5.09	TC	0.17	62	-0.65	81
41 Veneers and manufactured wood boards	18.88	TC	-0.46	92	-1.07	91
42 Joinery and wood products n.e.c.	12.46	TC	-0.02	77	-0.43	71
43 Furniture and mattresses	22.27	TC	-0.28	82	-0.95	81
44 Pulp, paper and paperboard	9.27	TC	-0.17	76	-0.97	86
45 Bags, fibreboard containers	20.60	TC	0.30	51	-0.42	70
46 Paper products n.e.c.	20.94	TC	-0.32	81	-0.98	87
47 Newspapers and books	0.48	TC	0.36	43	-0.28	25
48 Commercial printing	18.99	TC	0.11	66	-0.41	95
49 Chemical fertilisers	0.97	ER	1.31	14	0.05	17
50 Other basic chemicals	11.76	TC	-1.62	105	-2.38	106
51 Paints and varnishes	13.43	WT	-0.66	95	-1.22	95
52 Pharmaceutical products, etc.	17.51	TC	0.42	32	-0.51	73
53 Soap and detergents	6.09	TC	0.14	53	-0.35	62
54 Cosmetics and toilet preparations	11.19	TC	-0.29	83	-0.14	39
55 Other chemical products	0.12	TC	-0.29	83	-1.12	93
56 Petroleum and coal products	6.09	TC	0.41	34	-0.31	58
57 Glass and glass products	3.65	TC	-0.20	80	-1.00	88
58 Clay products and refractories	3.26	TC	0.39	36	-0.21	45
59 Cement	0.00	WT	0.44	30	-0.10	34
60 Ready mixed concrete	0.00	WT	0.45	28	-0.10	33

... continued

Table 3. (continued)

Industry	Base Period Tariff Rate	Trade Category	Simulation I		Simulation II	
			Proj- action	Rank	Proj- action	Rank
61 Concrete products	0.61	NT	0.35	44	-0.08	27
62 Other non-metallic mineral products	8.20	IC	0.22	57	-0.26	53
63 Basic iron and steel	3.28	IC	-0.22	86	-0.26	87
64 Basic non-ferrous metals and products	12.51	E	-2.53	5	0.37	5
65 Structural metals	12.51	IC	0.15	64	-0.33	60
66 Sheet metal products	15.14	IC	0.06	71	-0.40	68
67 Other metal products	17.35	IC	-1.06	98	-1.87	99
68 Motor vehicles and parts, etc.	27.10	IC	-3.46	108	-4.78	108
69 Ships and boats	14.80	IC	-0.31	85	-0.27	54
70 Railway rolling stock and locomotives	17.44	ER	0.34	48	-0.11	35
71 Aircraft	1.64	IC	0.18	60	-0.24	49
72 Photographic and scientific equipment	4.68	IC	-0.23	55	-0.20	44
73 Electrical equipment	19.03	IC	-1.14	100	-1.99	100
74 Household appliances and water heaters	22.59	IC	-0.34	89	-1.06	90
75 Other electrical equipment	18.24	IC	-0.56	93	-1.03	89
76 Agricultural machinery	7.09	ER	5.70	1	1.28	1
77 Construction machinery, etc.	17.45	IC	-0.31	86	-0.55	77
78 Other machinery and equipment	12.96	IC	-0.31	84	-0.68	82
79 Leather products	8.53	IC	-4.61	109	-5.58	109
80 Rubber products	21.98	IC	-1.14	99	-2.04	101
81 Plastic and related products	19.82	IC	-0.95	97	-1.87	98
82 Signs, writing and marking equipment	12.69	IC	-0.37	90	-1.07	92
83 Other manufacturing	15.59	IC	-0.76	96	-1.64	96
84 Electricity		NT	0.70	46	-0.68	74
85 Gas		NT	0.70	67	-0.61	79
86 Water, sewerage and drainage		NT	0.32	50	-0.25	50
87 Residential building construction		NT	0.41	33	-0.03	22
88 Other construction		NT	0.28	42	-0.08	30
89 Wholesale trade		NT	0.37	42	-0.32	39
90 Retail trade		NT	0.39	37	-0.07	14
91 Mechanical repairs		NT	0.50	25	-0.12	37
92 Other repairs		ER	0.54	23	-0.08	28
93 Rail transport		ER	0.34	46	-0.17	42
94 Railways and other transport, etc.		ER	0.46	27	-0.06	26
95 Water transport		IC	0.66	26	-0.08	29
96 Air transport		IC	0.90	19	-0.20	43
97 Communication		NT	0.34	47	-0.37	64
98 Banking		NT	0.22	58	-0.30	57
99 Non-bank finance		NT	0.42	32	-0.53	75
100 Investment and financial services		NT	0.35	43	-0.61	78
101 Insurance and insurance services		NT	0.38	38	-0.34	61
102 Other business services		NT	0.28	53	-0.39	67
103 Ownership of dwellings		NT	0.45	23	-0.39	65
104 Public administration		NT	0.03	72	-0.38	55
105 Defence		NT	0.00	72	-0.05	25
106 Health		NT	0.20	70	0.00	20
107 Education, museums and libraries		NT	0.23	56	-0.16	41
108 Welfare and religious institutions		NT	0.03	73	-0.03	23
109 Entertainment and recreation		NT	0.16	63	-0.11	36
110 Restaurants, hotels and clubs		NT	0.32	49	-0.22	46
111 Personal services		NT	0.38	39	-0.25	52
112 Non-competing imports		NT	0.43	31	-0.35	63
Aggregate employment			-0.00	76	-0.00	21
			0.25		-0.35	

* Tariff rates are nominal 1986-87 ad valorem rates expressed as percentages.

The trade categories are: export (E), export related (ER), import competing (IC), and nontraded (NT). Projections are expressed as percentage changes.

1) to the industry with the largest employment loss (position 112). The corresponding information for Simulation II appears in the fifth and sixth columns. The first column shows, for each manufacturing industry, the base-period ad valorem tariff rate levied against imports of the commodity that is in competition with the industry's output. The remaining (second) column contains a classification that is suggestive of the orientation of each industry to international trade. Industries designated import-competing (IC) sell in markets where the level of import penetration is significant and where imports and domestic output are close substitutes. For export industries (E), a significant proportion of output is exported and the levels of those exports are endogenously determined in the simulations. Export-related industries (ER) produce commodities that are not exported directly but which are sold largely to export industries. The final classification, nontraded (NT) is assigned to all other industries.

It is not our purpose to mount a comprehensive analysis of the industry projections, as protracted discussions of similar ORANI results are already available in Dixon et al. (1982, chapter 7) and Higgs (1986, chapter 6). However, all our results concerning the distribution of employment originate with the industry projections, and a selective review, at least, is warranted to support later deliberations.

An important feature of the industry results, and one that was foreshadowed in our interpretation of the macro results, is the close relationship between the ranking of an industry and its trade classification. In both simulations, the bottom of the ranking is dominated by import-competing industries, especially those belonging to the highly protected TCF (industries 31 to 39) and PMV (industry 68)

groups. More generally, an import-competing industry fares worse to the extent that it produces a commodity with

- (i) a high level of base period protection,
- (ii) a high import-domestic substitution elasticity,
- (iii) a high level of import penetration in its domestic market, and/or
- (iv) a domestic market that is adversely affected by the tariff cut.

Thus, Leather products (industry 79) suffers primarily because of the severe contraction of the Footwear industry (an important customer), whereas all four factors are influential in determining the low ranking of Other basic chemicals (industry 50).

The top end of both rankings is dominated by industries associated with exporting.¹¹ Most produce commodities for export directly, and benefit from reductions in their costs relative to the prices of their outputs in foreign markets. This group includes agricultural industries (1,2,3,8), mining industries (12,13,14) and industries involved in the processing of primary products (18,25,64). Other high-ranking industries belong to the export-related trade category and benefit from increased demand for their outputs by the export sector. Examples are the suppliers of meat (industries 4,5 and 8) and sugar (industry 6) to the food-processing industries 18 and 25, and the supplier of machinery (industry 76) to the agricultural sector.

Because the nominal wage rate is higher in Simulation II than in Simulation I, the economy is less competitive and the traded sector provides relatively less employment than the nontraded sector. Moreover, within the traded sector, export industries are more sensitive

to changes in the nominal wage rate than import-competing industries, and hence they provide relatively less employment in Simulation II. However, these differences in the distribution of employment between the two simulations are not sufficient to significantly upset the order of industries at the top or the bottom of the industry ranking. In particular, the industries occupying the top 16 positions for Simulation I are among the top 18 for Simulation II, while the same group of industries occupy the bottom 16 positions for both simulations.

As regards the industries of middle rank, two observations are appropriate. First, the majority of industries are not much affected by the tariff cut, with about three quarters experiencing employment changes of less than one per cent in each simulation. Second, for a small group of nontraded industries characterized by substantial sales to the government (i.e., industries 104 to 108), our fiscal assumption is important for the outcome. Aggregate output and employment (or, more broadly, the level of economic activity) expand in Simulation I and contract in Simulation II. However, real current government expenditure is held constant in both, and the government-related industries are insulated to some extent from developments in the rest of the economy. Consequently they assume somewhat higher rankings in Simulation II than they do in Simulation I.

III.3 Employment by Occupation

Table 4 contains employment projections for 61 occupations based on the Minor Groups of the Australian Classification of Occupation (Australian Bureau of Statistics, 1976). These projections are derived from the industry projections of Table 3 on the assumption that the

Table 4. Projected Effects of a 25 per cent Tariff Cut : Employment by Occupation*

Occupation	Base Period (000)	Simulation I		Simulation II	
		Proj- action	Rank	Proj- action	Rank
1 Architects, engineers, surveyors, professional	62	0.22	33	-0.43	46
2 Chemists, physicians and other physical scientists	16	0.27	26	-0.33	33
3 Medical practitioners, dentists	36	0.22	31	-0.16	17
4 Nurses, including probationers and trainees	151	0.22	32	-0.16	18
5 Professional medical workers n.e.c.	30	0.28	22	-0.10	13
6 Teachers	271	0.04	52	-0.04	6
7 Law professionals	17	0.26	28	-0.35	39
8 Artists, entertainers, writers and related workers	44	0.25	29	-0.25	26
9 Draftsmen and technicians n.e.c.	114	0.15	42	-0.42	45
10 Other professional, technical and related workers	143	0.14	43	-0.34	34
11 Administrators and executives, government, n.e.c.	20	0.15	41	-0.08	11
12 Employers, workers on own account, managers, n.e.c.	346	0.21	34	-0.37	41
13 Book-keepers and cashiers	110	0.26	27	-0.30	28
14 Stenographers and typists	100	0.18	38	-0.31	30
15 Other clerical workers	913	0.20	35	-0.32	31
16 Insurance, real estate salesmen, auctioneers, valuers	44	0.33	16	-0.34	36
17 Commercial travellers and manufacturers agents	54	0.17	39	-0.49	49
18 Proprietors, shopkeepers, salesmen, shop assistants	523	0.36	13	-0.07	9
19 Farmers and farm managers	382	1.46	2	0.08	2
20 Farm workers, including farm foremen	160	1.23	3	0.03	3
21 Other rural workers	21	0.16	40	-0.24	25
22 Miners, quarrymen, mineral prospectors, etc.	35	2.02	1	0.28	1
23 Pilots, navigators and ships officers	8	0.53	6	-0.13	15
24 Railway firemen and drivers	12	0.58	5	-0.05	7
25 Postmasters	4	0.35	15	-0.35	38
26 Postmen and messengers	28	0.33	18	-0.34	35
27 Road transport drivers	198	0.33	17	-0.21	21
28 Railway guards and conductors	5	0.45	7	-0.06	8
29 Stationmasters, inspectors and supervisors, transport	4	0.43	8	-0.08	10
30 Other railway workers and traffic controllers	19	0.43	9	-0.14	16
31 Telecommunication workers	25	0.28	23	-0.35	37
32 Other transport and communications workers	18	0.42	11	-0.09	12
33 Spinners, weavers, knitters, dyers, etc.	22	-3.38	60	-4.35	60
34 Tailors, cutters, furriers, etc.	69	-1.59	59	-2.08	59
35 Leather cutters, sewers, etc.	13	-7.75	61	-8.84	61
36 Furnacemen, rollers, drawers, etc.	16	0.10	48	-0.88	56
37 Watchmakers, jewellers, etc.	25	0.14	45	-0.48	48
38 Mechanics, plumbers, metal machinists, etc.	468	0.02	54	-0.65	54
39 Electrical and electronic workers	167	0.28	24	-0.37	42
40 Metal and electrical production process workers	97	-0.69	58	-1.55	58
41 Carpenters, cabinet makers, etc.	140	0.14	44	-0.38	43
42 Painters and decorators	55	0.14	46	-0.36	40
43 Bricklayers, plasterers, construction workers n.e.c.	148	0.31	20	-0.12	14
44 Compositors, printing machinists, engravers, etc.	44	0.09	49	-0.47	47
45 Millers, bakers, butchers, brewers, etc.	109	0.82	4	-0.00	5
46 Pottery, tobacco, chemical, paper production workers	35	-0.05	56	-0.86	55
47 Paper products, rubber, plastic production workers	47	-0.57	57	-1.27	57
48 Packers, wrappers and labellers	31	0.08	50	-0.64	53
49 Excavating and lifting equipment operators	85	0.27	25	-0.40	44
50 Storemen and freight handlers	135	0.07	51	-0.56	51
51 Labourers n.e.c.	243	0.11	47	-0.51	50
52 Fire brigade, police, protective services workers	60	0.19	37	-0.19	20
53 Housekeepers, cooks, maids and related workers	191	0.30	21	-0.22	22
54 Waiters, bartenders	93	0.37	12	-0.24	24
55 Caretakers, cleaners (buildings)	104	0.19	36	-0.30	27
56 Barbers, hairdressers and beauticians	36	0.43	10	-0.33	32
57 Launderers, dry cleaners and pressers	17	0.03	53	-0.58	52
58 Athletes, sports persons and undertakers	9	0.35	14	-0.22	23
59 Photographers	6	0.32	19	-0.31	29
60 Service, sport, recreation workers n.e.c.	76	0.25	30	-0.17	19
61 Members of armed services	72	0.00	55	-0.17	19
Aggregate Employment	6636	0.25		-0.35	

* Projections are expressed as percentage changes.

occupational composition of the workforce in each industry does not change as a result of the tariff cut. The table shows, for Simulations I and II, the percentage change in employment for each occupation and the position assumed by the occupation in a ranking that runs from gainers to losers. For reference, the table also records the base-period (1984-85) level of employment for each occupation.

According to our methodology, workers belonging to a particular occupation are mobile between all industries which employ that occupation, and the change in employment for a occupation is obtained as a weighted sum of the changes in employment for the relevant industries. The weight attached to industry j in the summation for occupation k is the base period employment of occupation k in industry j expressed as a share of total base period employment of occupation k. In other words, the weights sum to one and industry changes are averaged to obtained occupational changes. Now, although many of the occupations in the classification of Table 4 might appear from their nomenclature to be industry-based rather than skill-based, only one (Members of the armed services) is confined to a single ORANI industry (Defence). Hence it turns out that the variability of employment changes across occupations is markedly less than the variability across industries. In Simulation I, for example, the largest employment gain is reduced from 5.70 per cent (for industry 76) in the industry classification to 2.02 per cent (for occupation 22) in the occupational classification. The largest employment loss is similarly reduced from 10.72 per cent (for industry 39) to 7.75 per cent (for occupation 35). More generally, only six occupations experience employment changes greater than one per cent in Simulation I. In Simulation II, that number falls to five.

An occupation that appears near the top (or bottom) of one of the occupational rankings typically does so because most of its workers are employed in an industry - or group of related industries - that appears near the top (or bottom) of the corresponding industry ranking. Consider the six occupations with employment changes in excess of one per cent in Simulation I (i.e., occupations 19, 20, 22, 33, 34, 35). For occupation 19 (Farmers and farm managers), more than 97 per cent of employment is concentrated in the agricultural industries 1 to 9, all of which are among the top 20 gainers in Simulation I.¹² Occupation 20 (Farm workers) is similarly disposed, with more than 70 per cent of its workers employed in the agricultural sector. Occupation 22 (Miners, quarrymen, etc.) relies on the mining sector, with the export industries 12, 13 and 14 accounting for about 70 per cent of its employment. All three industries are among the top 10 gainers in Simulation I.¹³ At the bottom end of the ranking, occupations 33, 34 and 35 are all closely associated with lowly-ranked industries in the TCF sector. Workers belonging to occupation 34 (Tailors, cutters, etc.) are concentrated (56 per cent) in industry 38 (Clothing), those belonging to occupation 35 (Leather cutters, sewers, etc.) are concentrated (68 per cent) in industry 39 (Footwear), while more than 90 per cent of those belonging to occupation 33 (Spinners, weavers, knitters, etc.) are employed in one or the other of the textile and clothing industries (industries 31 to 38).

In Simulation II, the employment gains of the exporting agricultural and mining industries are largely eliminated, and no occupation increases its employment by more than one per cent. However, employment now falls by more than one per cent in occupations 40 (Metal and electrical production workers) and 47 (Paper products, rubber,

plastic production workers), as well as occupations 33, 34 and 35. As we move further up an occupational ranking from the bottom (or down from the top), the industry composition of the employment change for an occupation tends to become more complex. Hence, in tracing the sources of change for occupations 40 and 47, it is instructive to consider explicitly the major terms in the relevant weighted sums. The details are set out in Table 5.

For occupation 40, the contribution of seven industries (i.e., industries 64, 67, 68, 73, 74, 75 and 76) have been separately identified. Table 5 shows that industry 68, for example, supplies 19 per cent of the base period employment of occupation 40 (column 3), and suffers a reduction of 3.46 per cent in its own employment in Simulation I (column 4). Hence its contribution to the occupational employment change in Simulation I (column 5) is given by $(0.19 \times -3.46) = -0.66$ per cent. The final outcome for the occupation (i.e., $+0.69$ per cent) is obtained by summing the contributions of all industries, i.e., by summing the entries in column 5. In the same way, columns 6 and 7 reveal that industry 68 contributes $(0.19 \times -4.78) = -0.92$ per cent to the total change of -1.55 per cent in the employment of workers belonging to occupation 40 in Simulation II.

With the aid of Table 5, it is clear that industry 68 (Motor vehicles and parts) is most influential in determining the change in employment in occupation 40 (Metal and electrical production process workers), notwithstanding the fact that it employs less than 20 per cent of workers belonging to that occupation. Industry 68 is particularly dominant in Simulation I, where the negative contributions of the other

Table 5. Projected Effects of a 25 per cent Tariff Cut :
Decomposition of Employment by Occupation.

Occupation	Contributing Industries	Base Period Employment Share	Simulation I		Simulation II	
			Industry Projections	Occupation Projection	Industry Projections	Occupation Projection
40	64	0.02	+2.55	+0.09	+0.37	+0.01
	67	0.08	-1.06	-0.09	-1.87	-0.15
	68	0.19	-3.46	-0.66	-4.78	-0.52
	73	0.06	-1.14	-0.07	-1.99	-0.12
	74	0.08	-0.34	-0.03	-1.06	-0.09
	75	0.11	-0.56	-0.06	-1.03	-0.12
	76	0.02	+5.70	+0.09	+1.28	+0.02
	Other	0.42				-0.04
	Total	1.00	-0.69			-1.55
47	79	0.03	-4.61	-0.13	-5.58	-0.15
	80	0.13	-1.14	-0.15	-2.04	-0.27
	81	0.26	-0.95	-0.25	-1.87	-0.49
	Other	0.58				-0.36
	Total	1.00	-0.57			-1.27

* All projections are expressed as percentage changes.

industry's importance: industry 79 employs only three per cent of workers belonging to occupation 47 and yet accounts for 23 per cent of its employment change under Simulation I, and 12 per cent under Simulation II.

Continued application of the decomposition technique illustrated in Table 5 furnishes a comprehensive explanation of the occupational rankings in terms of the industry results. It reveals, inter alia, the following relationships, which we state without further recourse to supporting numerical evidence:

- (i) Occupation 45 (Millers, bakers, butchers, etc.) owes its high ranking to the food-processing export industries 18 and 25.
- (ii) The export-related industry 94 (Railway transport, etc.) supplies transport margins to agricultural and mining export industries. As a result, four of the top 10 occupations in Simulation I (i.e., occupations 24, 28, 29 and 30) are related to railways.
- (iii) At the other end of the ranking, occupation 38 (Mechanics, plumbers, metal machinists, etc.) is affected primarily by industry 68 (Motor vehicles and parts), whereas occupation 46 (Potters; tobacco, chemical, paper production workers) responds to changes in the import-competing industries 31 (Man-made fibres, yarns, etc.) and 50 (Other basic chemicals).
- (iv) Employment changes in occupation 57 (Laundresses, dry cleaners and pressers) receive important contributions from industry 38 (Clothing) and industry 111 (Personal services). In Simulation

(subsidiary) import-competing industries 67 (Other metal products), 73 (Electronic equipment), 74 (Household appliances and water heaters) and 75 (Other electrical equipment) are roughly balanced by the positive contributions of the export industry 64 (Basic non-ferrous metals and products) and the export-related industry 76 (Agricultural machinery). In Simulation II, employment is lower in both the export and import-competing sectors, industries 64 and 76 contribute very little, and the subsidiary import-competing industries become more prominent.

The main contributions to employment change in occupation 47 (Paper products, rubber, plastic production workers) come from industries 79 (Leather products), 80 (Rubber products) and 81 (Plastic and related products). All three are import-competing and, as such, provide less employment in Simulation II than in Simulation I. Note again that the employment share alone is not a reliable indicator of an

I, these contributions have opposite signs and tend to cancel; in Simulation II they are both contractionary.

We previously observed that the order of the industries at the extremes of the industry ranking is much the same for the two simulations. Generally speaking, the same is true of the occupational rankings, with seven occupations (i.e., occupations 19, 20, 22, 24, 28, 29, and 45) appearing among the top ten in both simulations, and eight (i.e., occupations 33, 34, 35, 38, 40, 46, 47 and 57) appearing among the bottom ten in both. (All of these occupations have already figured in our discussion of the rankings.) Remarkably, however, occupation 6 (Teachers) and 61 (Members of the armed services) move from the bottom 10 in Simulation I to the top 10 in Simulation II. Occupation 61 is employed entirely in industry 105 (Defence) which, in turn, sells all its output to the government. Thus, the employment in this occupation is completely isolated from the effects of the tariff cut, regardless of the wage assumption, and depends on our fiscal assumption. Occupation 6 is similarly connected, deriving 96 per cent of its employment from an industry (Education and libraries) that sells 92 per cent of its output to the government. Hence these occupations tend to do relatively poorly when the rest of the economy expands (as in Simulation I) relative to the public sector, and relatively well when the rest of the economy contracts (as in Simulation II). The fiscal assumption is also responsible for the considerably higher rankings of occupations 3, 4, 5, 11, 52 and 60 in Simulation II.

III.4 Employment by Selected Social Characteristics

Our final employment projections concern a number of social groups characterized by demography (age, sex and marital status), country of birth, area of residence and highest qualification. Projections for each social group are computed by taking appropriate weighted sums of the changes in occupational employment presented in Table 4. They rest on the assumption that the distribution of workers employed in an occupation across a set of groups (e.g., across groups differentiated by country of birth) is independent of the tariff cut. To the extent that workers are not mobile between occupations, the assumption implies that there are enough unemployed workers belonging to each group in the set to accommodate the projected increases in occupational employment. Results for all the social groups are reported in Table 6, which is constructed in the same way as Table 4 for occupations.

Although the projections for the social groups are computed from the employment changes in all 61 occupations previously identified, they are conveniently interpreted in terms of a more aggregate classification containing only five occupations. These five are: Farming and mining (occupations 19, 20, 22), TCF (occupations 31 to 39), Other manufacturing (occupations 36 to 51), Government-related (occupations 3, 4, 5, 6, 11, 52, 60 and 61) and Other occupations. From the discussion of the preceding subsection, we know that the constituent occupations within each of these five groups tend to experience similar changes in employment. Thus, for purposes of interpretation, we introduce Table 7 containing employment projections for the five

Table 6. Projected Effects of a 25 per cent Tariff Cut : Employment by Selected Social Groups*

Social Group	Base Period (000)	Simulation I		Simulation II	
		Proj- action	Rank	Proj- action	Rank
Age, sex and marital status -					
1 Male teenagers (age 15-19)	224	0.19	6	-0.45	7
2 Young males (age 20-24)	224	0.22	4	-0.39	6
3 Adult males (age 25-54)	2886	0.28	2	-0.35	5
4 Senior males (age 55+)	553	0.16	1	-0.35	4
5 Female teenagers (age 15-19)	179	0.23	7	-0.34	2
6 Married women (age 20+)	1536	0.23	3	-0.34	3
7 Single women (age 20+)	703	0.19	5	-0.31	1
Country of birth -					
1 Australia	4967	0.29	1	-0.32	5
2 United Kingdom	629	0.21	9	-0.36	10
3 Italy	164	0.20	10	-0.47	15
4 Greece	111	-0.08	25	-0.73	26
5 Yugoslavia	103	0.04	23	-0.63	23
6 Netherlands	58	0.19	11	-0.42	13
7 West Germany	70	0.27	3	-0.37	11
8 Austria	17	0.12	19	-0.45	14
9 Czechoslovakia	10	0.13	15	-0.50	19
10 Hungary	20	0.05	21	-0.59	22
11 Malta	34	0.13	17	-0.49	18
12 Poland	27	0.13	16	-0.48	16
13 Other Europe	82	0.12	18	-0.49	17
14 China (excluding Taiwan)	19	0.24	7	-0.29	3
15 India	16	0.26	4	-0.34	7
16 Lebanon	2	0.10	20	-0.56	21
17 Malaysia	15	0.17	13	-0.30	4
18 Vietnam	13	-0.49	27	-1.18	27
19 Other Asia	86	0.04	22	-0.50	20
20 United States of America	18	0.26	5	-0.22	1
21 Canada	6	0.27	2	-0.27	2
22 Other America	22	0.00	24	-0.63	24
23 Egypt	14	0.18	12	-0.42	12
24 South Africa	13	0.16	14	-0.34	8
25 Other Africa	12	0.25	6	-0.33	6
26 New Zealand	71	0.22	8	-0.35	9
27 Other Oceania	16	-0.16	26	-0.68	25
Area of residence -					
1 New South Wales - metropolitan	1479	0.18	9	-0.37	9
2 New South Wales - ex-metropolitan	833	0.38	5	-0.30	7
3 Victoria - metropolitan	1246	0.08	12	-0.47	12
4 Victoria - ex-metropolitan	530	0.45	3	-0.27	4
5 Queensland - metropolitan	479	0.17	11	-0.37	10
6 Queensland - ex-metropolitan	555	0.44	4	-0.25	3
7 South Australia - metropolitan	408	0.18	10	-0.38	11
8 South Australia - ex-metropolitan	172	0.52	2	-0.22	2
9 Western Australia - metropolitan	403	0.22	7	-0.33	8
10 Western Australia - ex-metropolitan	185	0.56	1	-0.22	1
11 Tasmania	181	0.31	6	-0.30	6
12 Northern Territory and Australian Capital Territory	167	0.21	8	-0.29	5
Highest qualification -					
1 Never went to school	13	-0.08	7	-0.80	7
2 No qualifications since school	3622	0.30	1	-0.35	5
3 Trade qualifications	1251	0.15	6	-0.46	6
4 Certificate / diploma	1137	0.26	3	-0.26	3
5 Bachelor degree / post-graduate diploma	440	0.20	4	-0.24	2
6 Higher qualifications	67	0.19	5	-0.19	1
7 All others	107	0.30	2	-0.32	4
Aggregate Employment	6636	0.25		-0.35	

* Projections are expressed as percentage changes.

Table 7. Projected Effects of a 25 per cent Tariff Cut : Employment by Occupational Groups*

Occupational Group	Base Period (000)	Simulation I		Simulation II	
		Proj- action	Rank	Proj- action	Rank
1 Farming and mining (19,20,22)	577	1.43	1	0.08	1
2 Manufacturing -					
TCF (33,34,35)	105	-2.76	5	-3.43	5
Other (36 to 51)	1844	0.10	4	-0.54	4
3 Government related (3,4,5,6,11,52,60,61)	716	0.13	3	-0.10	2
4 Other (all other occupations)	3395	0.26	2	-0.28	3
Aggregate Employment	6636	0.25		-0.35	

* All projections are expressed as percentage changes.

occupational groups, and Table 8 containing the base period distribution of employment across the five occupational groups for all social groups.

III.4.1 Demographic characteristics

As each social group contains workers belonging to a number of different occupations, the variability of the employment changes across social groups in even less pronounced than the variability across occupations. For the first set, in which groups are differentiated by demographic characteristics, the variability is very small indeed; the change in employment is always within 0.12 percentage points of the change in aggregate employment, and no group meets with a change of more than half a per cent in either simulation.

Within this narrow range, however, the simulations produce quite different ordering of the groups. In Simulation I, Senior males and Adult males do best because a comparatively large share of their employment is provided by occupations in the Farming and mining group.

In Simulation II, when the distribution of employment is weighted more

Table 8. Distribution of Employment across Occupational Groups by Selected Social Groups, 1984-85, Percentages

Social Group	Occupational Groups						Other	Total
	Farming and Mining	Manufacturing	TCF	Other	Govt	Other		
Demographic characteristics -								
1 Male teenagers (age 15-19)	8.2	1.4	61.0	4.5	27.8	100.0	100.0	
2 Young males (age 20-24)	7.0	0.9	49.3	7.7	35.2	100.0	100.0	
3 Adult males (age 25-54)	9.8	0.7	37.5	9.4	42.6	100.0	100.0	
4 Senior males (age 55+)	17.3	1.0	36.7	5.0	40.1	100.0	100.0	
5 Female teenagers (age 15-19)	0.8	2.5	5.4	14.9	66.6	100.0	100.0	
6 Married women (age 20+)	8.3	3.4	6.8	19.1	72.3	100.0	100.0	
7 Single women (age 20+)	1.8	2.0	4.7					
Country of birth -								
1 Australia	9.8	1.1	25.2	11.7	52.2	100.0	100.0	
2 United Kingdom	4.0	1.2	31.4	10.6	52.8	100.0	100.0	
3 Italy	12.1	5.6	43.7	1.8	36.9	100.0	100.0	
4 Greece	5.7	9.8	39.1	2.5	42.9	100.0	100.0	
5 Yugoslavia	6.8	4.7	56.8	1.3	30.3	100.0	100.0	
6 Netherlands	8.0	1.3	36.0	7.5	47.2	100.0	100.0	
7 West Germany	9.7	0.8	35.8	5.8	47.8	100.0	100.0	
8 Austria	0.0	3.3	44.9	8.3	43.6	100.0	100.0	
9 Czechoslovakia	4.5	2.2	38.3	6.4	48.6	100.0	100.0	
10 Hungary	5.6	2.9	37.2	12.4	41.9	100.0	100.0	
11 Malta	2.8	0.6	57.0	0.0	39.5	100.0	100.0	
12 Poland	3.4	2.6	43.2	5.8	45.1	100.0	100.0	
13 Other Europe	4.4	3.9	39.7	4.8	47.2	100.0	100.0	
14 China (excluding Taiwan)	0.0	0.0	23.8	5.4	70.8	100.0	100.0	
15 India	8.3	1.3	20.8	13.0	56.6	100.0	100.0	
16 Lebanon	10.0	9.8	40.9	2.8	36.5	100.0	100.0	
17 Malaysia	0.0	0.0	12.4	30.9	56.7	100.0	100.0	
18 Vietnam	0.0	17.3	50.1	0.0	32.6	100.0	100.0	
19 Other Asia	9.8	5.5	26.4	12.7	54.5	100.0	100.0	
20 United States of America	5.1	0.0	0.0	24.2	70.7	100.0	100.0	
21 Canada	4.6	0.0	8.9	12.3	74.2	100.0	100.0	
22 Other America	1.9	2.7	56.9	2.3	36.1	100.0	100.0	
23 Egypt	0.0	0.0	33.0	3.4	63.6	100.0	100.0	
24 South Africa	3.6	3.8	10.5	17.7	64.4	100.0	100.0	
25 Other Africa	6.1	0.0	16.8	18.1	58.9	100.0	100.0	
26 New Zealand	4.4	1.9	28.1	13.3	52.2	100.0	100.0	
27 Other Oceania	0.0	7.2	22.7	23.9	46.2	100.0	100.0	
Area of residence -								
1 New South Wales - metropolitan	1.5	1.1	28.5	9.5	59.3	100.0	100.0	
2 New South Wales - ex-metropolitan	17.2	1.3	29.6	10.0	42.0	100.0	100.0	
3 Victoria - metropolitan	2.1	3.6	28.9	11.1	54.2	100.0	100.0	
4 Victoria - ex-metropolitan	23.7	1.7	26.6	10.4	37.6	100.0	100.0	
5 Queensland - metropolitan	1.8	1.6	28.9	12.1	55.7	100.0	100.0	
6 Queensland - ex-metropolitan	19.7	0.6	26.6	10.5	42.7	100.0	100.0	
7 South Australia - metropolitan	2.9	1.5	30.9	13.1	51.6	100.0	100.0	
8 South Australia - ex-metropolitan	26.7	0.6	24.5	10.2	38.0	100.0	100.0	
9 Western Australia - metropolitan	3.3	0.7	26.5	11.5	58.0	100.0	100.0	
10 Western Australia - ex-metropolitan	27.1	0.2	22.7	7.6	42.4	100.0	100.0	
11 Tasmania	9.3	0.7	25.7	11.8	52.5	100.0	100.0	
12 Northern Territory and A.C.T.	2.2	0.4	15.0	18.3	64.2	100.0	100.0	
Highest qualification -								
1 Never went to school	17.3	11.0	37.3	7.3	27.1	100.0	100.0	
2 No qualifications since school	12.2	1.8	25.1	4.1	56.9	100.0	100.0	
3 Trade qualifications	3.7	2.4	63.3	4.0	26.6	100.0	100.0	
4 Certificate / diploma	6.0	0.5	9.8	28.3	55.5	100.0	100.0	
5 Bachelor degree / post-graduate diploma	2.0	0.1	2.6	34.7	60.7	100.0	100.0	
6 Higher qualifications	2.5	0.0	0.9	54.4	42.2	100.0	100.0	
7 All others	10.6	1.2	13.1	6.8	68.3	100.0	100.0	
Aggregate Employment	8.7	1.6	27.8	10.8	51.2	100.0	100.0	

in favour of occupations in the nontraded sector (i.e., in favour of the Government and Other occupational groups), Single women and Female teenagers do best. Within the female workforce, the employment share of Married women in the Farming and mining group is quite high;¹⁴ hence Married women do better than other female workers in Simulation I and worse in Simulation II. Male teenagers do poorly in both simulations because their employment is closely tied up with the import-competing manufacturing sector.

III.4.2 Country of birth

The second set of projections distinguishes workers by country of birth. In this set, the groups that do relatively well again deviate only marginally from the average, the maximum deviation being 0.13 percentage points for workers born in the United States in Simulation II. However, a number of groups now do quite a bit worse than the average, reflecting the more prominent role of the TCF sector. In the demographic projections, occupations in the TCF group provide no more than 3.4 per cent of total employment for any group; in the birth place projections, the TCF occupations provide more than double that share for four groups, i.e., for workers born in Greece, Lebanon, Vietnam and Other Oceania. In the case of Lebanese-born workers, the influence of the TCF sector is offset to some extent by a large employment share in the Farming and mining occupations; however, the other three birthplace groups occupy the bottom positions of the ranking for both simulations. Vietnamese-born workers not employed in the TCF occupations are comparatively concentrated in the Other manufacturing group, which is also import-competing. For that reason their employment falls

significantly more than of any other group and exceeds one per cent in Simulation II.

At the top of the rankings, employment of Australian-born workers increases the most in Simulation I because the share of their employment originating in the Farming and mining sector is comparatively high, while the share originating in the Manufacturing sector is comparatively low. In Simulation II, the Australian-born workers are displaced at the top by workers from the United States as the employment of the latter group is particularly concentrated in the nontraded sector. Note also that Malaysian-born workers, who are employed in proportionately higher numbers in Government occupations than any other group, improve their ranking considerably in Simulation II.

III.4.3 Area of residence

Turning to the groups of workers with different areas of residence, it is now the relative gainers who experience the larger deviations from the average change in employment, at least in the first simulation. All five ex-metropolitan groups enjoy employment increases in excess of 0.36 per cent, the highest increase recorded by any of the demographic or birthplace groups. Not surprisingly, the results are conditioned by the large concentrations of ex-metropolitan workers in the Farming and mining occupations. Among the relative losers, only the lowest ranked group (Victorian-metropolitan) has an employment increase more than 0.10 percentage points below the average of 0.25 per cent. This group has an employment share in the TCF sector which is twice as large as the national average.

In Simulation II, the influence of the Farming and mining sector is less pronounced and the outcomes for the metropolitan and ex-metropolitan groups are much more similar. The latter groups still remain at the top of the ranking but no group in the set now deviates by more than 0.13 percentage points from the average, as compared with deviations of up to 0.31 percentage points under Simulation I.

For workers resident in Tasmania, the employment share in the Farming and mining sector lies between the shares for the metropolitan and ex-metropolitan groups, and the Tasmanian group assumes a commensurately middle order ranking in both simulations. Workers in the Territories are comparatively concentrated in the non-traded sector, and in the Government sector in particular; hence their ranking improves in Simulation II.

III.4.4 Highest qualification

The same kind of considerations are relevant to the final set of social groups, which deals with the highest educational qualification. The first group (Never went to school) in the set has a larger share of its members employed in the TCF than any other social group (in any of our four sets). Consequently it ranks last in both simulations for the current set. Nevertheless, it still does not do as badly as the Vietnamese born group in the birthplace set, as it also has a large share of employment in the Farming and mining sector. Group 1 is joined at the bottom of the rankings by group 3 (Trade qualifications), which has more workers employed in the Manufacturing sector as a whole than any other social group.

Apart from group 1, two other groups (i.e., group 2 (No qualifications since school) and group 7 (All others)) in the final set have large employment shares in Farming and mining, and they head the ranking in Simulation I. In Simulation II, the top positions are appropriated by the two groups with the largest shares of employment in the nontraded sector, i.e., group 5 (Bachelor degree/postgraduate diploma) and group 6 (Higher qualification). Group 6, which has the highest share of all the social groups in the Government sector, experiences the smallest reduction in employment of all the groups in Simulation II. Even so, it is still only 0.16 percentage points below the average reduction of 0.35 per cent. Indeed, with the exception of group 1, no group experiences a deviation from the average of more than 0.16 percentage points in either simulation.

IV SUMMARY AND CONCLUSIONS

In this paper we have analysed the short-run effects of a 25 per cent cut in tariff protection on employment in 112 industries, 61 occupations and 53 other groups differentiated by a selection of social characteristics. Our results indicate that the major effect is to transfer employment from import-competing to export-orientated industries. Under a scenario of "real wage maintenance" (Simulation I), there is a small increase of 0.25 per cent in aggregate employment. Under "full wage discounting" (Simulation II), the real wage rate increases by 0.60 per cent and aggregate employment falls slightly by 0.35 per cent.

Among the disaggregated results, those at the industry level display the largest variability. Many industries (16 in Simulation I

and 25 in Simulation II) suffer employment losses of more than one per cent, but the most serious (more than three per cent, say) are confined to the heavily protected TCF (textiles, clothing and footwear) and PMW (passenger motor vehicles) sectors, or to industries which are specialized suppliers of the TCF sector. Fifteen industries increase their employment by more than one per cent in Simulation I, all of them export industries or suppliers of export industries. In Simulation II, where the export industries are not so competitive in foreign markets, this group is reduced to a single member.

As workers belonging to most occupations are employed in a number of industries, the results at the occupational level are much more uniform. The number of occupations experiencing an employment loss of more than one per cent is three for Simulation I and five for Simulation II. All owe their losses to a close association with the TCF or PMW industries. Three export-related occupations increase their employment by more than one per cent in Simulation I, but none fare so well in Simulation II.

Results for the various social groups are derived on the assumption that the social composition of each occupation is not affected by the tariff cut. It follows that the variability of the employment changes across the social groups is even less marked than that across occupations. Of the 53 groups considered, 7 are distinguished by demographic characteristics, 27 by country of birth, 12 by area of residence and 7 by educational qualifications. In Simulation II, Vietnamese-born workers and workers who never went to school record employment losses of 1.18 per cent and 0.80 per cent, respectively. Both groups have important concentrations in the TCF sector. No other

social group experiences an employment change of more than three-quarters of one per cent in either simulation.

From a policy point of view, the importance of these observations is three fold. Firstly, insofar as one should be concerned about the employment effects of the tariff cut, it is the effect on the distribution, rather than the aggregate amount, that is critical. Secondly, the disruption caused to the labour market is considerably less at the occupational level¹³ than at the industry level, and, because the mobility of workers is greater between industries than between occupations, it is the occupational level that is more relevant for policy purposes. Finally, at least at the level of aggregation we have considered, the disruption that remains at the occupational level does not permeate through to other social groups to any great extent.

ENDNOTES

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1. For a recent overview of the role of the ORANI model in the Commission, see Industries Assistance Commission (1987).
 2. See Cook and Dixon (1982) and Bonnell, Chew and Dixon (1984), for example.
 3. 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).
 4. Further discussion of the operation of factor markets in our model is contained in Section III.3.
 5. Note that Census data alone is capable of supporting the kind of computations reported in this paper. However, we have employed the IHS data to generate our results for the various social groups because that data was already available to us in a convenient form from a more comprehensive project on income distribution (see Agrawal and Meagher (1987), for example). The 1981-82 Survey was a large one, involving about thirty thousand individuals, and, as such, we believe it constitutes a suitable database for our present purposes.
 6. In the database actually used, the population weights attached to each individual in the sample have been adjusted to reflect the numbers of persons who were employed, unemployed and not in the labour force in 1984-85. The adjustment of the weights was carried out as part of a more general update of the IHS data using a 'static adjustment aging' technique (see Orcutt, Merz and Quinke, 1986). However, only the weights adjustment is relevant to the present computations.
 7. The method whereby the 25 per cent reductions in the rates of Table 3 are converted into shocks to the relevant ORANI variables is described in Dixon et al. (1982), section 45.2.1.
 8. The duration of the ORANI short-run has been estimated to be about two years (Cooper, McLaren and Powell, 1985).
 9. The prices of foreign goods in foreign currency are assumed to be independent of the tariff cut.
 10. For further discussion on this point, see Meagher and Parmenter (1987), p.12.
 11. For an assessment of the sensitivity of these results to values adopted for the export demand elasticities, see Dixon, Parmenter and Rimmer (1986).

12. Since fixed capital and land are fixed in our simulations, changes in the employment of farmers must be interpreted with caution. Because of the high proportion of owner-operators in this occupation, a change in the demand for labour is likely to be met more by a change in the intensity and duration of the labour supplied by the already employed farmers, rather than by a change in the number of farmers employed.
13. Most workers belonging to occupation 21 (other rural workers) are employed in industry 10 (Forestry and logging) or industry 11 (Fishing and hunting). The former is particularly sensitive to the allocation of the investment budget between industries. In Simulation I, investment flows to the agricultural and mining industries, and hence occupation 21 is much more lowly ranked than the other rural-based occupations. In Simulation II, industry 10 improves its share of the investment budget considerably, its employment in Simulation II exceeding its employment in Simulation I by more than for any other industry (in percentage terms, at least). Hence occupation 21 moves up the ranking in Simulation II.
14. There is some evidence that a number of farmer's wives, who would not otherwise consider themselves to be in the labour force, declare themselves to be farmers for taxation purposes. If, for the sake of consistency, they also declare themselves to be farmers in the Census, the number of married women in the Farming and mining occupational group will be overstated.
15. For a more formal assessment of labour market disruption at the occupational level, see Dixon et al. (1984).

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