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THE EFFECTS OF STRUCTURAL CHANGE ON EMPLOYMENT, UNEMPLOYMENT AND LABOUR FORCE PARTICIPATION

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General Paper No. G-88 Melbourne November 1988

ISSN 1031-9034 ISBN 0 642 10336 4

ABSTRACT

In their survey of the labour market in the 1970's, Gregory and Duncan (1979) argued that the changing relationships between hours worked and persons employed, and between aggregate employment and unemployment, were at the heart of many of the unresolved empirical puzzles relating to the labour market during the seventies. In this paper we examine how structural change affects these relationships. Our analysis indicates that these relationships depend upon a number of inter-related factors including the industrial origins of employment changes, the distribution of these changes across full-time and part-time jobs and across demographic groups, and the differential labour force participation responses of these demographic groups. 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 1981-82 Income and Housing Survey database.

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I INTRODUCTION

In their survey of the Australian labour market in the 1970's, Gregory and Duncan (1979) argued that the following two changes were at the heart of many of the unresolved empirical puzzles relating to the labour market during the seventies:

(1) on the demand side, it was the changing relationship between the growth rates of aggregate hours worked and the number of people employed; and

(2) on the supply side, it was the changing relationship between aggregate employment and unemployment.

The authors further hypothesized that these changing relationships were caused by underlying changes in the structure of the economy. Structural change leads to a redistribution of employment across industries and

occupations. Further, because labour markets are segmented into full-time and part-time jobs, and into jobs depending on the demographic characteristics (such as age and sex) of workers, it alters the distribution of employment across full-time and part-time jobs, and across individuals who belong to various demographic groups. The change in the distribution of employment across full-time and part-time jobs affects the first of the relationships described above, i.e., the relationship between hours worked and persons employed. The redistribution of employment across demographic groups who differ in their participation behaviour affects the second relationship, i.e., the relationship between aggregate employment and unemployment.

This paper focuses on the effects of structural changes that result from two macroeconomic policies. Since 1983, the Commonwealth Government has pursued a wages policy which, via negotiations with the trade union movement, has produced a fall in the real hourly wage rate (as a cost) of about 3.5 per cent between 1983-84 and 1986-1987.[1] This wages policy has been necessitated by the need to generate surpluses in Australia's external trade account in order to meet the growing interest payments on its foreign debt. This policy has in fact helped to improve the international competitiveness of the economy and, in the process, has also generated strong employment growth. However, in the absence of tax reform, it has also resulted in a decline in the incomes of wage and salary

earners. To compensate for this, the government has initiated a program of reform in the personal income tax system. The preliminary stages of this reform have produced some tax cuts in December 1986 and in July 1987, with further (and more substantial) cuts promised for 1989-90 (see May Economic Statement, 1988).

In this paper we examine the labour market effects of these policies of 'wage restraint' and 'tax reductions'. Though these two policies have somewhat similar effects at the aggregate level, i.e., they both stimulate output and employment, they have remarkably different effects on the structure of the economy. While wage cuts reallocate resources from the non-traded to the traded sectors of the economy, tax cuts do the opposite (see Section IV.2 below). Because of the differences in their structural effects, the two policies also differ remarkably in their labour market outcomes. Hence, we use them to illustrate how structural change affects various relationships in the labour market. By examining the effects on these relationships, we are able to shed light on some recent labour market phenomena. Our analysis also indicates how future developments in the economy are likely to affect the labour market.

The analysis in this paper depends on simulations using an extended version of the ORANI model of the Australian economy, taken in conjunction with an updated version of the

Income and Housing Survey (IHS) database. The rest of the paper is set out as follows. Section II provides a brief description of the model. The simulations are specified in Section III. In Section IV we present the various results. Finally, Section V ends with the policy conclusion.

II THE MODEL

The results reported in this paper are generated via a three step procedure, the first of which is to solve the ORANI-NAGA model of the Australian economy.[2] The theoretical structure of the ORANI model is fully described in Dixon et al. (1982). Its 1977-78 database is documented in Blampied (1985). The main purpose of the NAGA extension to ORANI is to incorporate the national and government accounts. The theoretical structure of NAGA is specified in Meagher and Parmenter (1985, 1987), while its 1984-85 database is documented in Agrawal and Meagher (1988a).

The solution of the ORANI-NAGA model determines the effect of each policy simulation on a wide range of macro and structural variables of the economy, including employment changes in each of the 112 ORANI industries. In ORANI, the labour demand equations define the total demand for person-hours -- the product of persons and average hours worked per person (Powell, 1983). A shock to the ORANI-NAGA model produces changes in the demand for person-hours by each of

the 112 industries. Additional assumptions, concerning changes in hours per worker, are required to convert these projections into projections of changes in the number of persons employed. We assume that the average hours worked per person remain constant. Using this assumption, we calculate the change in the number of persons employed in each industry.

The second step of the procedure consists of converting these changes in the number of persons employed by the 112 ORANI industries to changes in the number of persons employed by the 61 occupations identified in the IHS database. This conversion assumes that the occupational composition of the labour force employed in each industry remains constant in each simulation. The 112-industry by 61-occupation employment matrix required for this conversion is obtained from the 1981 Census of Population and Housing.

The third step of the computational procedure utilizes unit record data from an updated version of the IHS database.[3] Each person in this database can be classified into one of three labour force categories: employed, unemployed, or not in the labour force. In our simulations, changes in employment by occupation (as calculated in Step 2), lead to changes in the employment of various individuals. This leads to corresponding changes in the number of workforce participants, since the labour force participation of individuals

responds to changes in their employment opportunities, and in the number of persons unemployed. We revise the IHS database to reflect these changes in the numbers of persons belonging to the various labour force categories. The procedure adopted for this revision is described in detail in Agrawal and Meagher (1988c).

III SPECIFICATION OF THE SIMULATIONS

III.1 The Assumed Economic Environment

In the following sections, we report results for two simulations. Three aspects of the economic environment should be borne in mind when assessing these results. The first concerns the level and composition of real domestic absorption. It is assumed that real private absorption and both its components (i.e., private consumption and private investment) vary in direct proportion to real private sector disposable incomes. Further, real public investment varies with real private investment, i.e., the shares of the public and private sectors in aggregate investment remain unchanged. We also assume that real current government expenditures on goods and services are exogenously determined. Finally, all rates of direct and indirect taxation are exogenous.

The second aspect of the economic environment concerns the operation of primary factor markets. In the labour market,

we take real wage rates as exogenously determined and assume that, in each occupation, labour is in excess supply at the going wage rate. This treatment is in accord with the centralized nature of the wage fixation process and the high levels of unemployment (in most occupations) that have characterized the Australian labour market in recent years. It implies that any induced changes in the demand for labour appear only as changes in employment and not as changes in the wage rates. In other factor markets, it is assumed that industry-specific physical capital and (where appropriate) land in use do not respond to the policy changes simulated, so that rental rates adjust to ensure that these factors remain fully employed. In this sense, our simulations should be considered to be short-run.[4]

The third central aspect of the economic environment concerns our choice of the numeraire. In both simulations, the nominal exchange rate is exogenous and all price changes are measured relative to it. This means that changes in the real exchange rate appear as changes in the domestic price level rather than as changes in the nominal exchange rate.

III.2 The Simulations

In order to be able to compare the effects of the two macro policies on the relationship between hours worked and persons employed, we calibrate the two simulations so that

they each result in a 1.0 per cent increase in the aggregate demand for persons. We then examine how they differ in terms of their effect on the demand for person-hours and how they affect the relationship between aggregate employment and unemployment.

In the first simulation, the employment increase is obtained via a cut in the average real wage rate (as a cost). It is assumed that the government is able to negotiate the extent to which nominal wages are indexed to the CPI, and is therefore able to manipulate the average real wage rate. According to ORANI-NAGA, a 1.0 per cent increase in the demand for persons can be achieved by a 1.0 per cent cut in the average hourly real wage rate (as a cost).

In the second simulation, it is a reduction in average income tax rates that, via private demand stimulation, causes the increase in employment. According to ORANI-NAGA, private demand stimulation is a relatively ineffective mechanism for generating employment .[5] Hence, it takes an increase of 6.4 per cent in aggregate private absorption to generate a 1.0 per cent increase in the demand for persons. In our simulations, real private absorption varies directly with real private disposable incomes (see Section IV.1). Hence, to obtain a 6.4 per cent increase in private absorption, the government has to first increase private incomes by 6.4 per cent. Since in 1984-85 (the base year for NAGA), the average

income tax rate was approximately 20 per cent, it takes a 32 (i.e., 6.4/0.2) per cent cut in this rate to achieve a 6.4 per cent increase in disposable incomes.

IV RESULTS

IV.1 Effects on Labour Market Aggregates

Table 1 contains the projected effects of the two policy simulations on labour market aggregates. Our results are typically presented in percentage change form. Thus the value 1.00 given for employment (measured in person-hours) in the first column of Table 1 has the following interpretation: about two years after the reduction in average real wage rates in Simulation I, employment will be 1.00 per cent higher than it would have been in the absence of the wage cut. Note that since the model is solved in a linearized form, the reader can easily calculate the effect of, say, halving a shock by halving all the projected values reported for that shock. Furthermore, if the reader is interested in calculating the effects of both shocks together on any given variable, he/she can do so by summing across the columns of Table 1 for that variable.

One of the striking results in Table 1 is that the two simulations differ considerably in their effect on the relationship between aggregate hours worked and the number of persons employed. Though both simulations lead to a 1.0

TABLE 1

Projected Effects on Various Labour Market Aggregates

	Variable	1984-85 Numbers ('000)	Simulation I* (Wage Cuts)	Simulation II* (Tax Cuts)
1	Employment -- (person-hours)	--	1.00	0.46
2	Persons employed --			
	(a) Full-time	5,500	1.01	0.84
	(b) Part-time	1,136	0.95	1.76
	(c) Total	6,636	1.00	1.00
3	Persons unemployed --			
	(a) Looking for full-time work	549	-6.67	-5.75
	(b) Looking for part-time work	70	-6.41	-9.83
	(c) Total	619	-6.64	-6.21
4	Persons not in the labour force --			
	(a) Who have looked for work in the survey year	165	-15.41	-16.96
	(b) Who have not looked for work in the survey year	4,512	0.00	0.00
	(c) Total	4,677	-0.54	-0.60
5	Total population aged 15+	11,932	0.00	0.00

* Simulation results are expressed as percentage changes for all variables.

per cent increase in the demand for workers, underlying these increases are substantially different increases in the demand for work-hours. While the wage cuts lead to a 1.0 per cent increase in the aggregate demand for work-hours, the tax cuts cause an increase that is only half as large (0.5 per cent). Thus, in Simulation II, a given increase in work-hours is distributed over twice as many persons as in Simulation I. This is because Simulation II creates significanly greater opportunities for part-time jobs (1.8 per cent) than for full-time ones (0.8 per cent), whereas Simulation I distributes employment more-or-less evenly across full-time and part-time jobs.

On the supply side too there are some noticeable differences between the outcomes of the two simulations. In Simulation I, every 100 new jobs created attract 38 new participants into the workforce. As a result, the net effect of the creation of 100 jobs is to reduce the number of unemployed persons by 62. In Simulation II, the participation response to increased employment opportunities is stronger. Every 100 new jobs created in this simulation attract 42 new participants into the workforce. As a result, the net effect of employment creation on the number of unemployed persons is smaller: every 100 jobs created now reduce the number of unemployed persons by only 58 (instead of by 62 as in Simulation I). Thus, for a given change in the number of jobs, wage cuts elicit a weaker participation response, and therefore have a stronger influence on unemployment than do tax cuts.

The results presented in Table 1 reveal that wage cuts and tax cuts have considerably different effects on the relationships beween hours worked and persons employed, and between aggregate employment and unemployment. What causes these two simulations to have such different labour market outcomes? The following sub-sections provide a detailed explanation.

IV.2 Effects on the Industrial Structure of the Economy

Table 2 contains the projected industrial results for the two simulations. Since all the other results presented in this paper originate in the industry projections, an understanding of these results is essential and therefore a brief discussion is provided here. For a more detailed discussion of these results, the reader is referred to Agrawal (1988).

Since the broad performance of an ORANI industry in our simulations can be satisfactorily explained with reference to its trade classification, for ease of exposition, we have aggregated the 112 ORANI industries into the following three sectors: exporting and export-related (ER), import-competing (MC), and non-trading (NT).[6] Export industries are those which sell a significant proportion of their output to foreigners. The export-related category (which we combine with the exporting) includes industries producing commodities which are not

TABLE 2

Projected Sectoral Effects

Variable	Simulation I* (Wage Cuts)	Simulation II* (Tax Cuts)
1 Exporting sector		
(a) Output	1.45	-9.80
(b) Employment	2.06	-13.74
2 Import-competing sector		
(a) Output	0.99	0.30
(b) Employment	1.19	0.35
3 Non-traded sector		
(a) Output	0.51	2.80
(b) Employment	0.69	3.95

* Simulation results are expressed as percentage changes.

exported directly but which are sold largely to export industries. The import-competing industries are those which sell in markets where the level of import penetration is significant and where imports and domestic output are close substitutes. The final trade classification, non-trading, is applied to all the remaining industries, i.e., to those that do not belong to any of the previous groups. Note that in the 1977-78 database of ORANI, the exporting sector broadly consists of the agricultural and mining industries; the import-competing sector largely coincides with the manufacturing industries; and the non-trading sector essentially contains the service industries.[7]

Column 1 of Table 2 indicates that the wage cuts stimulate all three sectors of the economy. However, they have a relatively more favourable effect on the exporting sector. This is because, with given world prices for their outputs, the fall in labour and other costs in this simulation leads to an improvement in the price/cost situation of exporters. Exporters respond to this improvement by expanding output and employment. This mechanism also underlies the increase in activity in the MC and NT sectors of the economy. However, in these sectors, prices are set in domestic rather than international markets, and some of the lowered costs are passed on in the form of lowered prices rather than as increased outputs. Hence, employment in these sectors rises by less than in the exporting sector.

Column 2 of Table 2 reveals that tax cuts, in contrast to wage cuts, have a very uneven effect on the industrial composition of output. Instead of stimulating all three sectors of the economy, they lead to a sharp decline in output in the exporting sector, a moderate increase in the non-traded sector, and only a minor increase in the import-competing sector. This is because increases in private demand resulting from the tax cuts are concentrated relatively heavily on the output of the non-traded sector. Producers in this sector respond to this increase in demand by increasing output. However, the demand increases also result in an increase in the prices of domestically-produced commodities. The ensuing cost increases impose a cost/price squeeze on the exporters, who respond by contracting output. The tax cuts also do not benefit producers in the MC sector as much as they benefit those in the NT sector. This is because close foreign substitutes are available for goods produced in the MC sector. The increase in the domestic price level following the tax cuts causes some demand to be switched away from domestically produced goods towards the now relatively cheaper foreign substitutes.

IV.3 Effects on the Relationship between Hours Worked and Persons Employed

Changes in the industrial composition of output lead to changes in the occupational composition of the workforce. Further, because the distribution of full-time and part-time jobs across occupations is quite uneven, they affect the allocation of employment between full-time and part-time jobs. This, in turn, affects the relationship between the number of hours worked and the number of persons employed. Hence, to understand changes in this relationship, we first need to examine the underlying changes in the occupational composition of employment.

Table 3 contains the projected effects of the two simulations for employment in ten aggregate occupational categories.[8] Given the industry-based nature of these occupational categories, and the previous discussion of the industrial results, these results are not difficult to explain. Since Simulation I leads to an expansion in activity in all sectors of the economy, it also leads to an increase in employment in all occupations. Furthermore, since it favours the export-oriented agricultural and mining industries, it favours Farmers and Miners, so that these groups of workers face employment increases (of 2.1 and 2.9 per cent, respectively) that are more than twice as large as those of other

TABLE 3

Projected Results for Employment by Occupation

	Occupation	Numbers employed in 1984-85 ('000)	Simulation I* (Wage Cuts)	Simulation II* (Tax Cuts)
1	Professional, technical workers	883	0.60	2.28
2	Administrative, managerial workers	366	0.93	3.35
3	Clerical workers	1,123	0.87	2.59
4	Sales workers	621	0.77	5.41
5	Farmers, fishermen, etc.	563	2.14	-13.78
6	Miners	35	2.89	-20.74
7	Transport, communication workers	322	0.94	0.25
8	Tradesmen, production-process workers	1,949	1.07	1.23
9	Service, sport, recreation workers	593	0.86	5.10
10	Armed services	72	0.00	0.00
	Others+	110	1.00	1.00
	All occupations	6,636	1.00	1.00

* Simulation results are expressed as percentage changes.

\+ This category consists of those whose occupation was either inadequately described, or not stated. We assume that in each simulation, the employment of these workers changes at the same rate as the average for that simulation.

groups of workers. In Simulation II, the results are quite different. Because of the uneven sectoral effects of increases in private demand, the occupational effects are also quite uneven. In contrast to Simulation I, not all groups of workers share in the increased employment opportunities in Simulation II. Instead, Farmers and Miners, who were relatively favourably affected in Simulation I, now experience severe job losses (of 13.8 and 20.7 per cent, respectively) because of their concentration in the shrinking exporting sector. The fate of Sales and Service workers is also reversed between the two simulations. These groups of workers are heavily concentrated in the non-traded sector of the economy and as a result fare below average in Simulation I (0.8 an 0.9 per cent, respectively) and well above average (5.4 and 5.1 per cent, respectively) in Simulation II.

Earlier, in Table 1, we had seen that the two simulations resulted in a considerably different allocation of employment across full-time and part-time jobs. Simulation I caused an almost equal distribution of employment across full-time (1.0 per cent) and part-time (0.9 per cent) jobs. In contrast, Simulation II led to a substantially stronger growth in part-time jobs (1.8 per cent) as compared with full-time ones (0.8 per cent). To understand these results, we employ the aid of Table 4, which provides a breakdown of the distribution of full-time and part-time jobs across occupations.

Table 4 reveals that even at the level of the broad occupational classification adopted in Table 3, the distribution of full-time and part-time jobs varies markedly across occupations. For example, it shows that there are relatively few part-time Miners (only 1.8 per cent) or part-time Tradesmen, production-process workers (only 5.4 per cent). In contrast, of all Service, sport and recreation workers, 40.9 per cent work part-time, and of all Sales workers, 26.2 per cent work part-time.

With the aid of Table 4, we are now able to relate the projected changes in the occupational composition of the workforce in each simulation to the projected changes in the full-time/part-time job opportunities in that simulation. Since the increased employment opportunities in Simulation I are more-or-less evenly spread across occupations, this simulation also leads to a somewhat equal distribution of jobs across full-time and part-time ones. In contrast, Simulation II leads to a redistribution of employment towards part-time jobs because it results in the largest increases in employment (of over 5 per cent each) for Service, sport and recreation workers and for Sales workers. As Table 4 indicates, of all occupations, these two have the highest concentration of part-time jobs.

To sum up, wage cuts leads to a more-or-less even distribution of employment across industries and occupations and hence, across full-time and part-time jobs. Tax cuts, in

TABLE 4

Employment in Ten Occupations Cross-classified by Full-time/Part-time Jobs

	Occupation	Full-time jobs	Part-time jobs	All jobs
1	Professional, technical workers	81.8 (13.1)	18.2 (14.1)	100.0 (13.3)
2	Administrative, managerial workers	94.1 (6.3)	5.9 (1.9)	100.0 (5.5)
3	Clerical workers	77.7 (15.9)	22.3 (22.0)	100.0 (16.9)
4	Sales workers	73.8 (8.3)	26.2 (14.3)	100.0 (9.4)
5	Farmers, fishermen, etc.	81.3 (8.3)	18.7 (9.3)	100.0 (8.5)
6	Miners	98.2 (0.6)	1.8 (0.1)	100.0 (0.5)
7	Transport, communication workers	91.6 (5.4)	8.4 (2.4)	100.0 (4.8)
8	Tradesmen, production-process workers	94.6 (33.5)	5.4 (9.3)	100.0 (29.4)
9	Service, sport, recreation workers	59.1 (6.4)	40.9 (21.3)	100.0 (8.9)
10	Armed services	98.7 (1.3)	1.3 (0.1)	100.0 (1.1)
	Others*	46.4 (0.9)	53.6 (5.2)	100.0 (1.7)
	All occupations	82.9 (100.0)	17.1 (100.0)	100.0 (100.0)

* This category consists of those whose occupation was either inadequately described, or not stated.

Note that the first set of numbers for each occupation are the row breakdowns and sum to 100 across each row. The second set of numbers, i.e., the numbers in parentheses, are the column breakdowns and sum to 100 in each column.

contrast, reallocate jobs from full-time to part-time workers. Hence, Simulation II distributes a given change in the demand for work-hours over twice as many workers as does Simulation I.

The above analysis can help shed light on some recent labour market phenomena. Gregory and Duncan (1979) noted that the rates of growth of total number of hours worked and total number of persons employed moved together from the mid 1960's to the mid 1970's, but began to diverge sharply thereafter. After the mid 1970's, due to the rapid growth of part-time employment, the number of persons employed grew faster than the number of hours worked. As a result, there was a marked difference in the growth of productivity per worker and productivity per hour worked. A recent survey of the labour market (see Budget Statements, 1987-88), however, indicates that since 1984, this relationship has again changed dramatically: the two series of employment (of persons and person-hours) have again started to grow at the same rate. Thus, since 1984, measured labour productivity has not been greatly different whether measured as output per worker or output per hour-worked.

According to our analysis, an important explanation for the re-convergence of the two employment series lies in the nature of the underlying structural changes that have been taking place in this period. Between 1983-84 and 1986-87,

negotiations between the Commonwealth Government and the trade union movement produced decreases in the real hourly wage rates of about 3.5 per cent. Thus, in contrast to the earlier period when employment growth resulted primarily from demand increases, since about 1983 real wage decreases have been responsible for the bulk of the strong employment growth witnessed in this period. As we have seen above, employment increases resulting from wage decreases lead to (approximately) equal increases in full-time and part-time jobs and hence cause equal increases in hours-worked and persons employed. Our analysis also indicates that if, in the future, private demand expansion again become the primary stimulus for employment growth, then we are likely to return to the pattern observed between the mid-seventies and the mid-eighties, with a divergence between the growth rates of different measures of employment, and in particular, with the employment of persons outpacing the employment of person-hours.

IV.4 Effects on the Relationship between Aggregate Employment and Unemployment

In this section, we examine how the simulations affect the allocation of jobs across various demographic groups who differ in their participation behaviour and how this, in turn, affects the relationship between aggregate employment and unemployment. Table 5 contains the projected full-time and

TABLE 5

Projected Results for Employment by Demographic Group

	Demographic Group	Numbers employed in 1984-85 ('000)	Simulation I* (Wage Cuts)	Simulation II* (Tax Cuts)
1	Male teenagers (age 15-19)	224	1.06	1.05
2	Young males (age 20-24)	552	1.02	0.98
3	Adult males (age 25-54)	2,889	1.04	0.40
4	Senior males (age 55+)	553	1.18	-0.87
5	Female teenagers (age 15-19)	179	0.87	3.75
6	Married women (age 20+)	1,536	0.94	1.60
7	Single women (age 20+)	703	0.83	2.94
	All groups	6,636	1.00	1.00

* Simulation results are expressed as percentage changes.

part-time employment changes for seven demographic groups. It reveals that in Simulation I, all groups of workers experience employment gains. However, male workers enjoy a greater increase in their employment opportunities than do their female counterparts. The largest employment increases are enjoyed by senior males (1.2 per cent) and the smallest by single women (0.8 per cent). However, the differences between the employment gains of the various groups are not very large. In Simulation II, the situation is quite different. Firstly, all groups no longer experience employment increases. Instead, senior males now experience net jobs losses (of 0.9 per cent). Secondly, the relative winners and losers in Simulation II are quite different from those in Simulation I. Senior males, who had been the largest gainers in Simulation I, are now the largest losers. In contrast, female teenagers, who had experienced the second lowest employment increases in Simulation I (0.9 per cent), now emerge as the largest gainers (3.8 per cent). Finally, we notice that in comparison with the effects of wage cuts, tax cuts lead to a larger disparity between the outcomes for various groups. Instead of employment changes ranging from 0.8 per cent to 1.0 per cent, we now witness changes ranging from -0.9 per cent to 3.8 per cent.

The demographic projections contained in Table 5 can be explained with the aid of Table 6, which contains the occupational distribution of the seven demographic groups listed in Table 5. Table 6 reveals that the distribution of these

TABLE 6

Employment of Seven Demographic Groups Cross-classified by Occupation

	Occupation	Demographic Group: Male teenagers	Young males	Adult males	Senior males	Female teenagers	Married women	Single women
1	Professional, technical workers	1.3	5.8	13.7	8.0	5.0	16.2	21.4
2	Administrative, managerial workers	0.6	2.2	8.5	9.4	0.5	2.5	2.1
3	Clerical workers	6.2	12.6	8.2	7.4	40.1	28.9	34.9
4	Sales workers	13.5	6.9	6.8	5.7	29.1	12.2	11.9
5	Farmers, fishermen, etc.	8.8	7.0	9.3	17.1	0.8	8.3	1.8
6	Miners	0.1	0.4	1.0	0.7	0.0	0.0	0.0
7	Transport, communication workers	1.5	4.3	7.3	6.5	1.1	1.7	2.6
8	Tradesmen, production-process workers	62.5	50.2	38.2	37.7	7.9	10.3	6.8
9	Service, sport, recreation workers	2.9	6.2	4.8	6.0	12.6	16.1	15.7
10	Armed services	0.9	3.2	1.7	0.0	0.4	0.0	0.3
	Others*	1.8	1.1	0.4	1.4	2.4	3.8	2.5
	All occupations	3.4 (100)	8.3 (100)	43.5 (100)	8.3 (100)	2.7 (100)	23.2 (100)	10.6 (100)

* This category consists of those whose occupation was either inadequately described, or not stated.

Note that the numbers in this table are column breakdowns and sum to 100 in each column.

demographic groups varies markedly across occupations. For example, it shows that while 62.5 per cent of male teenagers are employed as Tradesmen, production-process workers, the corresponding figure for female teenagers is only 7.9 per cent. Further, while almost 70 per cent of female teenagers are employed as Clerical and Sales workers, these occupations account for less than 20 per cent of male teenagers. For the other demographic groups also there is a marked pattern of occupational segmentation of the labour market.

Tables 4 and 6 together reveal the pattern of labour market segmentation according to full-time and part-time jobs and according to demographic characteristics. They indicate that one important explanatory factor underlying the occupational segmentation of the labour market into male and female occupations is the differences in the preferences of the sexes between full-time and part-time jobs[9], and in the differences in the allocation of these full-time and part-time jobs across occupations. Females tend to be relatively heavily concentrated in occupations such as Sales and Services, which have a higher proportion of part-time jobs than other occupations (see Table 4). In contrast, males tend to be dominant in occupations such as Farming and Mining, which have a relatively higher proportion of full-time jobs than other occupations.

Table 6 reveals one reason helping to explain why senior males enjoy the largest employment gains in Simulation I and suffer the largest employment losses in Simulation II: of all groups, senior males have the heaviest concentration in the Farmers and fishermen occupation, which experiences a large expansion in Simulation I, and a sharp contraction in Simulation II. The table also reveals why the relative position of female teenagers is reversed between Simulations I and II. This group of workers is heavily concentrated in two occupations: Sales, which accounts for almost 30 per cent of all female teenagers, and Services, sport, and recreation, which accounts for another 13 per cent. As discussed above, the wage cuts in Simulation I favour employment in export-oriented occupations such as Farming and Mining, whereas the tax cuts in Simulation II favour employment in service-oriented occupations.

Above, we have seen how changes in the structure of the economy lead to a redistribution of jobs across different demographic groups. Next we examine how the differences in the participation behaviour of these groups affect the relationship between aggregate employment and unemployment. In a recent study, Peters and Petridis (1985) have estimated the participation responses of seven demographic groups to changes in the probability of their being employed. The results of their estimation for the period 1974 to 1983 are presented in Table 7. The table also reports

TABLE 7

Labour Force Participation and Employment, 1974 to 1983

Dependent variable: participation rate of demographic group	Estimated coefficients[a]		Elasticity at means[b]	
	Full-time employment (b_1)	Part-time employment (b_2)	Full-time employment	Part-time employment
Male teenagers (age 15-19)[c]	.4639	1.3884	.342	.101
Young males (age 20-24)	.0794	.0835	.063	.004
Adult males (age 25-54)	.2571	.0659	.234	.002
Senior males (age 55+)[c]	.9119	1.1429	.773	.105
Female teenagers (age 15-19)[c]	.3769	.7917	.243	.105
Married women (age 20+)[c]	.8959	1.2248	.412	.588
Single women(age 20+)[c]	.8977	.7588	.651	.132
Aggregate[c]	.4419	·8395	.333	.131

(a) Source: Peters and Petridis (1985).

(b) These elasticities are evaluated from group means using data from an updated version of the 1981-82 Income and Housing Survey database.

(c) For these groups, the difference between the coefficients of the full-time and part-time employment ratios is significant at the 5 per cent level.

the values of the resultant participation elasticities which we have evaluated from group means using data from our updated version of the IHS database. These elasticities have been incorporated into our procedure for calculating the change in the number of workforce participants, and hence in the number of unemployed persons, in response to projected changes in employment (see Section II).

Table 7 shows a marked dispersion of full-time employment coefficients across demographic groups and, for groups for whom part-time employment is important (teenagers and married women), significantly higher part-time than full-time coefficients. Thus, it supports the Gregory and Duncan (1979) conjecture that, because of labour market segmentation, some jobs have a higher propensity to be filled from outside the labour force, and others from the unemployment pool. For example, Table 7 indicates that part-time jobs will have a higher tendency to be filled by workers who were previously not in the workforce (versus workers from the unemployment pool) than full-time jobs. It also indicates that, on average, females and teenagers will tend to enter a job from outside the workforce, whereas males and adults will tend to enter it from the unemployment pool.

Tables 5 and 7 together explain why the two simulations lead to a different relationship between aggregate employment, unemployment and labour force participation. Simulation I

causes a reallocation of employment towards the traded sector and hence towards jobs that tend to be full-time and male-dominated and therefore have a high propensity to be filled from the unemployment pool. In contrast, Simulation II redistributes employment towards the non-traded sector and hence, towards part-time and female-dominated jobs which have a high propensity to be filled from outside the labour force. Thus, a given change in aggregate employment elicits a weaker participation response, and therefore has a stronger effect on the unemployment rate, if the employment change is caused by changes in the wage rate rather than by changes in the income tax rate.

The above analysis can help provide an understanding of some recent labour market phenomena. In their study on the relationship between aggregate employment, the labour force, and unemployment over the period 1967 to 1985, Peters and Petridis (1985) noted that the adjustment of labour force participation to changing employment opportunities had been "especially low" in the last four years of this period. As a result, employment decreases between 1981 and 1983 have been accompanied by sharper-than-usual increases in the unemployment rate, and employment increases between 1983 and 1985 have been accompanied by unusually large decreases in the unemployment rate.

According to our analysis an important explanation for this weakened relationship between employment changes and participation responses since 1981 lies in the fact that since then, employment changes have been strongly influenced by sharp changes in the wage rates. Between 1981 and 1983, the average real hourly wage rate increased by 7.6 per cent and between 1983 and 1985, it fell by 3.0 per cent.[10] Our analysis has shown why employment changes that are caused by changes in the real wage rates are likely to have a smaller effect on labour force participation than similar changes caused by demand increases. Our analysis also indicates that, if in the future, private demand expansion again becomes the primary influence on employment growth, then we are likely to return to the pattern observed prior to 1981, with employment increases having a relatively larger effect on participation and a correspondingly smaller effect on unemployment.

V CONCLUSION

The task of restructuring the Australian economy is not yet complete. In the medium term at least, there is likely to be continued and sustained pressure to reallocate resources from the non-traded to the traded sector. This is essential for reducing Australia's foreign debt. In this study we have seen how during periods of structural change, the established relationships between various labour market aggregates are likely to breakdown. In such times, changes in the

unemployment rate, for example, no longer bear a close relationship to any of the other observable macro-aggregates such as wages, output and employment. Instead, as shown in this paper, they are "the outcome of a complex set of behavioural and distributional factors" (Peters and Petridis, 1985, p. 63). In such an evnironment, it is not feasible to base policy only on empirically observed relationships between a few macro aggregates. If compositional changes are important -- and in a world of structural change, by definition they are -- such macro 'relationships' depend not only on the sizes of changes in aggregates, but also on what brought them about. If the unemployment rate is to be a target of macroeconomic policy, conventional macroeconomics (used alone) is not likely to provide a reliable tool.

APPENDIX 1

Employment of Seven Demographic Groups Cross-classified by Full-time/Part-time Jobs

	Demographic Group	Full-time jobs	Part-time jobs	All jobs
1	Male teenagers (age 15-19)	91.0 (3.7)	9.0 (1.8)	100.0 (3.4)
2	Young males (age 20-24)	93.9 (9.4)	6.1 (3.0)	100.0 (8.3)
3	Adult males (age 25-54)	97.3 (51.1)	2.7 (6.8)	100.0 (43.5)
4	Senior males (age 55+)	90.2 (9.1)	9.8 (4.8)	100.0 (8.3)
5	Female teenagers (age 15-19)	83.0 (2.7)	17.0 (2.7)	100.0 (2.7)
6	Married women (age 20+)	48.9 (13.7)	51.1 (69.1)	100.0 (23.2)
7	Single women (age 20+)	80.7 (10.3)	19.3 (12.0)	100.0 (10.6)
	All groups	82.9 (100.0)	17.1 (100.0)	100.0 (100.0)

Note that the first set of numbers for each demographic group are the row breakdowns and sum to 100 across each row. The second set of numbers, i.e., the numbers in parentheses are the column breakdowns and sum to 100 in each column.

ENDNOTES

* I am grateful to Alan Powell for helpful comments on an earlier draft of this paper. This paper is an output from a project which aims to provide a detailed elaboration of income distributional issues within a computable general equilibrium framework. This project is being carried out collaboratively by Tony Meagher (at the Institute of Applied Economic and Social Research, University of Melbourne) and the author. Support from the Australian Research Grants Scheme (which is financing Tony Meagher's contribution) is gratefully acknowledged.

1. See Economic Round-up, The Treasury, June 1988, AGPS.

2. 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).

3. The updating procedure is described fully in Agrawal and Meagher (1988b). Briefly, the population weight attached to each individual in the sample was 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 for the present computations.

4. Cooper, McLaren and Powell (1985) have estimated the duration of the ORANI short-run to be about two years.

5. The relative effectiveness of wage cuts and tax cuts in generating employment have been analysed in Agrawal (1988).

6. For the assignment of each of the 112 industries in ORANI to one of these trade classifications, see Table 45.4 of Dixon et al. (1982).

7. The 1977-78 database of ORANI does not reflect the recent boom in tourism in Australia and the subsequent opening up of parts of the services sector (such as hotels and entertainment industries) to foreign trade.

8. The results for the detailed 61 occupations identified in the IHS database are available upon request from the author.

9. See Appendix 1 for the differences in the distribution of the seven demographic groups across full-time and part-time jobs.

10. See Economic Round-up, The Treasury, June 1988, AGPS.

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