UNIVERSITY OF TASMANIA
Centre for Regional Economic Analysis
GPO Box 252 - 90
Hobart
Tasmania 7001
Australia
Telephone (03) 6226 2269
Facsimile (03) 6223 8053

THE ECONOMIC CONSEQUENCES OF PAY EQUITY FOR FEMALE-INTENSIVE OCCUPATIONS: A MULTIREGIONAL CGE ANALYSIS

by

John R Madden

Paper presented to the 13th International Conference on Input-Output Techniques
University of Macerata, 21 - 25 August, 2000

The Economic Consequences of Pay Equity for Female-Intensive Occupations: A Multiregional CGE Analysis

John R Madden

Centre for Regional Economic Analysis, University of Tasmania,
Hobart, Tasmania 7000 Australia

Abstract: Despite Australian Equal-Pay laws, requiring equal remuneration for work of equal value, having been in existence for three decades, Australian men continue to earn significantly more than Australian women. A recent inquiry by the New South Wales Industrial Relations Commission into Pay Equity considered the degree to which the persistence of the gender pay-gap is due to the undervaluation of work in female-dominated occupations. As part of its input to the inquiry, the NSW Treasury commissioned a study (Madden, 1998) to model the economic consequences of introducing pay equity reforms in the state. The present paper is based on the report of the modelling study.

Three illustrative simulations were undertaken with a two-region computable general equilibrium model of the Australian economy. The first involved raising wages in all female-dominated occupations (those where at least 65 per cent of workers are women) in the state of NSW by 3 per cent. This resulted in a 1 percentage point closure in the gender wage-gap. The other two simulations involved pay rises for specific occupations in NSW: Librarians and Hairdressers.

Major short-run results for the first simulation were a decrease in Australian employment of 0.3 per cent, a decline in GDP of about half that and a 0.4 per cent rise in the consumer price index. Activity and employment are more severely affected in NSW with a fall in the state's employment by half a per cent. However the extra income to workers in female-dominated occupations leads to only a 0.2 per cent decline in NSW real household consumption. The negative effects on NSW are much smaller in the long-run. This reflects an assumption of a return to the original natural rate of national unemployment in the long-run. Only a negligible decline in male employment in NSW is projected, but female employment is projected to be still significantly adversely affected in NSW in the long run. It is projected to be over 0.6 per cent lower as a result of the pay-equity reform.

1. Introduction[1]

In 1998 the New South Wales Government initiated an inquiry into Pay Equity by the Industrial Relations Commission (IRC) of NSW. This inquiry examined whether pay-equity principles should be incorporated into the NSW award-setting process. Pay equity relates to the concept of *equal pay for work of equal value*, going beyond the narrower concept of *equal pay for equal work*.

In undertaking the Inquiry, the IRC was required to have regard to the possible consequences for the NSW economy of pay equity adjustments As part of its input to the Inquiry, the NSW Treasury commissioned the Centre for Regional Economic Analysis at the University of Tasmania to undertake modelling work to determine the possible NSW economy-wide impacts, for a given set of award adjustments. This paper draws on the study's report (Madden 1998).

[1] I would like to thank Dr Sang-Hee Han of the Economic Research and Forecasting Branch (ERFB) of the NSW Treasury who undertook all computer simulations reported in this paper and much of the data computations. I am also grateful for discussions with other NSW Treasury staff, particularly Mr Richard Cox, Director of ERFB, and Ms Nara Puthucheary. All responsibility for any errors is of course mine.

2. Method of Analysis

2.1 Overview of Method

The principal vehicle of analysis for this study was a two-region computable general equilibrium (CGE) model of the Australian economy. The model used was the two-region NSW version - hereafter M2R (NSW) - of the MONASH Multi-regional Forecasting (MMRF) model. The most material ways in which the M2R (NSW) model differs from MMRF in that it has many more industries than MMRF, but M2R (NSW) encompasses only two regions, NSW and the Rest of Australia (RoA).[2] The latter region is simply an aggregation of the five other states and two territories which are explicitly modelled in MMRF. The MMRF and M2R (NSW) models are outlined in section 2.2 below.

While, M2R (NSW), contained the necessary industry disaggregation for the present study, it had insufficient occupational detail for a full analysis of the pay-equity question. It was therefore necessary to amend the occupational modelling in M2R (NSW) to introduce explicitly female-dominated occupational classes and to decompose labour by gender.

2.2 The MMRF and M2R (NSW) Models

2.3

The basic MMRF model captures the behaviour of twelve industries, a representative regional household, State and Territory Governments, the Commonwealth Government and investors in each of Australia's eight states and territories. The model recognises that the economies of the eight regions are linked via interstate movements of commodities and factors of production (particularly labour). The complexity of MMRF is indicated by the fact that in total, the basic model contains over 27,500 equations relating to more than 50,000 variables.[3]

The model is composed of five modules. These are:

(1) the core module which determines the outputs of regional industries and their demand for commodity and factor inputs, international and interstate exports and imports, regional household demands, demands by nine governments (Commonwealth and eight states and territories) and factor and commodity prices;

(ii) the government finance module which computes revenue and outlays changes for the Commonwealth Government and each of the eight State and Territory governments. The module also determines the gross domestic products of the eight regions from the income and expenditure side using variables determined in the core module, together with regional household income;

(iii) the capital and investment module which determines the relationship between changes in the capital stock and annual investment;

(iv) the foreign debt accumulation module which relates changes in foreign debt over the solution/forecast period to changes in the average annual trade deficit;

(v) the labour market and regional migration module which computes the changes in population from natural growth and foreign and interregional migration and relates it to labour supply.

For further details on the MMRF model see Naqvi and Peter (1996) and Crowe (1995) and for a full description of the theoretical structure of the model see Peter, *et. al* (1996).

---

[2] M2R (NSW) also contains a much more detailed explicit treatment of state government taxes.

[3] The dimensions of the M2R (NSW) model used in this study are significantly larger than the basic MMRF model. While featuring only two regions the model we use has much greater disaggregation of industries, occupations and indirect taxes.

The M2R (NSW) model has essentially the same theoretical structure as MMRF, with some modifications, however, to introduce into the model the decomposition of sales and production tax variables into separate state and Commonwealth tax components.

There is, however, a significant difference in the range of variables between the two models' data bases. M2R (NSW) features 129 industries instead of the twelve industries in the standard MMRF data base. In order to cope with the increased size of M2R, and in line with the aim that the model essentially be focussed on New South Wales, the number of regions are aggregated to only two, NSW and RoA.

The M2R (NSW) results reported in this study are 'comparative static'. They represent a snapshot of the national and NSW economies in the future showing the difference due *only* to the pay equity measures considered. The results represent the percentage change in the value of variables above or below what would have occurred in the absence of the measures. The results are not forecasts as they do not indicate the future values or growth rates of any economic variables, and the model does not provide a description of the adjustment path to either the short-run or long-run equilibriums.

2.3 Amendments to the M2R (NSW) Model

2.3.1 Data-base changes

The amendments to the M2R (NSW) model were designed to provide it with the relevant occupational and gender detail necessary to undertake a proper pay-equity analysis.

The M2R (NSW) model, like MMRF, has in its standard form eight occupations for each regional industry. The M2R data base provides extra disaggregation into take-home pay, PAYE taxes and payroll taxes. The data base tasks for the current project were to:

- decide on an appropriate occupational classification for the amended model;
- employ appropriate information to split the M2R occupation information into the more detailed occupational classes and into genders.

The second of these tasks required considerable data manipulation and estimation. The details are explained in Appendix A of Madden (1998). In this section we consider only the occupational classification question.

It was decided that the choice of classifications should be based primarily on maximising as far as possible the number of female-intensive occupations that are separately identified. A second question involved making a decision on an exact definition of female-intensity in terms of the data on which it should be calculated. Should it be the basis of persons or hours, for full-time or total employees?

Table A1 in Appendix A shows information relating to employment in the 282 occupational (unit group) classifications specified in the First Edition of the Australian Bureau of Statistics' Australian Standard Classification of Occupations (ASCO).[4]

[4] The First Edition of ASCO was used as this was the classification on which CREA held a data set on occupations, by industry by region. The Second Edition of ASCO which came into operation in 1997 has 342 occupations at the unit-group level. It should be noted that the unit-group or 4-digit code is not the most disaggregated classification in ASCO. There are 1079 (6 digit) occupations in the first edition of ASCO, but obtaining data at this level was outside the resources of the current project.

Figures are shown in the table for the number of males and females in each occupation for both New South Wales and Australia as a whole. This reflects a choice to use persons rather than hours data.[5] The figures are for total employees rather than full-time employees as it was felt that part-time employees were important in determining the female-intensity of an occupation.[6]

Female-intensity figures were calculated for both NSW and Australia and occupations were ranked according to female-intensity. However, the primary ranking was done on the basis of the Australian female-intensity figures, rather than the NSW figures. This was done because it was considered that the Australian employment figures were less subject to statistical errors. The employment figures in Table A1 clearly reveal that, for occupations with low numbers, the employment estimates were expanded from only one or two people in the sample selected for the May 1996 survey. This was a much more noticeable problem at the NSW level where if, for instance, there was low male-intensity, there was a good chance that for some industries no males would be selected, giving a female intensity of 100 per cent. In general, we consider the primary use of the Australian female-intensity figures rather than one for New South Wales is unlikely to have made any significant difference to our results.[7]

It was decided to model separately virtually all (4-digit) occupations with a female-intensity greater than fifty per cent.[8] The only omissions were six of the seventeen occupations, over 50 per cent but less than 60 per cent female, that had somewhat of a miscellaneous character, and Dancers and choreographers. This last group is clearly a female-intensive occupation, but numbers which are assigned to this classification are so small that there were no reliable figures on the occupation available for use in constructing our data base.[9]

Thus, there were 68 female-intensive (unit group) occupations that were to be modelled. These occupations were separated from the standard eight (major group) occupations. This gave a total of 76 occupations for the new version of M2R (NSW). A list of these occupations can be found in Table 3 of section 3.3. The eight male-intensive occupations (the residuals of the major group occupations once the female-intensive groups are extracted) are:

[5] Persons would seem a more natural choice and we are unaware of any substantive argument for undertaking the lengthy conversion to hours data.

[6] It might be argued that a superior approach would be to derive a set of full-time equivalent figures upon which to derive the female-intensity figures, but this was outside the resources of this project.

[7] Given sufficient time and resources, the data base for this project could have been compiled from scratch, using 1996 census data. However, the pay-off from this extra work in terms of improved results is likely to be minimal.

[8] In terms of the standard economic usage of factor-intensity an occupation with a female-intensity figure of greater than half could be described as female-intensive. This differs from the notion of a female-dominated occupation, for which there is no agreed definition in terms of female intensity. For the purposes of this report we have defined female-dominated to mean occupations with a female-intensity of 65 per cent or more.

[9] This last occupation could be added relatively easily to our data base, using 1996 population census data.

M2R Occupation No.	*Occupation Name*
3	Other Managers And Professionals
24	Other Professionals
29	Other Para-Professionals
33	Other Tradespersons
50	Other Clerks
65	Other Sales And Personal Services Workers
69	Other Plant And Machinery Operators, Drivers
76	Other Labourers And Related Workers

Details of how the occupation by industry, by region and by gender data matrices were estimated are described in Appendix A of Madden (1998).

2.3.2. Amendments to M2R Theoretical Structure

The only substantive change to the model's theoretical structure that was introduced for the current project involved equations that compute aggregate employment, nationally and regionally, by gender.

Consideration was also given to introducing input demand equations for occupation variables specified by industry, region and gender. This would have allowed full use to be made of the data base's new gender disaggregation. While the current theory allows substitution between occupations by a regional industry, there is no provision for substitution between genders within an individual occupation.

It was decided not to introduce these new input demand equations, however, since there was no ready information available on inter-gender substitution. Furthermore, it was unnecessary for the simulations undertaken for this paper, as it was assumed in all cases that there was no change in relative wages between genders *within* any given occupation. Therefore it could be expected, that whatever were the inter-gender substitution possibilities inserted into the model, that the gender shares within an occupation would not be changed from their initial base-year proportions by the pay-equity measures modelled in that study.[10]

3. Simulating the Impacts of Pay Equity

3.1 Wage Shocks

Simulations were designed to capture the following types of pay-equity wage measures:

- an across-the-board 1 per cent pay rise to all employees, both male and female, in all of the 51 occupations defined as female-dominated;[11]
- an across-the-board pay rise to female-dominated occupations sufficient to close the gender wage gap by one percentage point;
- specified pay rises to:
  - hairdressers.
  - librarians

The two across-the-board pay-equity wage increase are essentially the same simulation. The second being a multiple of the first. We will discuss only the second of the across-the-board

[10] This expectation assumes that gender proportions are not affected by the scale of output (i.e. a homothetic production function).

[11] It should be recalled that, for the purposes of this report, a female-dominated occupation has been defined as one with a female-intensity equal to or greater than sixty-five per cent.

simulations in this paper, referring to it as the general pay-equity measure, although results for the first simulation are shown in the results tables.

For the second simulation, the general pay-equity increase, we calculated the pay rise to employees in female-dominated occupations as follows;

The first step is to define the gender wage gap in percentage terms as:

$$g = \left(\frac{f}{m} - 1\right)100,$$

where f is average female earnings and m is average male earnings. Thus:

$$dg = d\left(\frac{f}{m}\right)100$$
$$= \frac{f}{m}\left(\hat{f} - \hat{m}\right),$$

where $\hat{f}$ and $\hat{m}$ are percentage change versions of f and m.

Next, consider a one per cent increase in average wage rates for all female-dominated occupations.[12] Since, just over 60 per cent of the total NSW female wage bill is accounted for by female-dominated occupations, the immediate impact on average NSW female earnings is 0.6025 per cent. Similarly, the immediate impact on average NSW male earnings is 0.0912 per cent.[13] Substituting these results (together with a base-period gender average-earnings ratio of just over 0.6535) into the above equation, we get:

dg = 0.3342 percentage points.

This implies that a 2.99 per cent increase in the average wage rate for each female-dominated occupation will result in an immediate reduction in the gender-wage gap of one percentage point.

The pay rises were modelled as an immediate increase in the nominal wages of all workers in the selected occupations by the required percentage. It should be noted that we do not consider the method by which the pay rise comes about. We have nothing to say about whether the pay-equity measures are instituted via changes to award rates only, or about the size of any award wage rises. We simply assume that the measures had the outcome of an immediate rise by the specified percentage in the average wage for the relevant occupation. [14]

[12] We do not distinguish between the concepts of wages and earnings in this report.
[13] Just over 9 per cent of all NSW male earnings are earnt by workers in female-dominated occupations.
[14] Within any occupation there are in reality a whole range of wages reflecting such things as level of position, seniority, and the like. Some workers in the occupation will be on award wages while others will not. The M2R model does not distinguish between units of labour within an occupation. Consequently one can model correctly a non-uniform increase in wages within an occupation, equal to the average wage rise, provided that the intra-occupational wage rise pattern is the same for all using industries.

3.2 Simulation Assumptions

Each of the simulations was conducted under both short-run and long-run assumptions. The former represents a solution period of one to two years, sufficient for various price adjustments to occur in commodity markets, but insufficient time for capital to be reallocated between activities. The latter represents a solution period of a number of years (perhaps 6 to 8 years) which are required to allow the labour market and regional-industry levels of capital stocks to adjust fully.

The assumptions required to simulate the short-run effects of the wage shocks are relatively straightforward. The major assumptions employed are as follows:

- Fixed capital stocks in all industries with rates of return adjusting to reflect changes in demands for capital services;
- Real wages allowed to vary only by the size of the initial pay change, with the change in labour demand being met principally by changes in aggregate employment;
- The rate of technical change is unaffected by the pay measures;
- The nominal exchange rate is the numeraire;
- Governments keep all tax rates constant with changes in revenue and expenditure impacting on their borrowing requirements;
- Trade balance allowed to vary in line with changes in domestic savings and investment.

The settings which should be used for the long-run simulations are more problematic. The key to the long-run outcome for all economic variables, is the effect that the proposed pay-equity measures might have on the overall wage setting process. This is something that is not an output of the M2R (NSW) model.

The effect of the wage rise in the short-run is to raise the average real wage in the relevant occupation(s) by the amount of the nominal pay increase. A little over a quarter of the wage bill in NSW is subject to the pay increases involved in the across-the-board wage increase to all female-dominated occupations. As will be seen from Table 1 in the next section this results, for the first pay-equity simulation,[15] in an increase in the Australian real wage of 0.1 per cent and a decline in national employment of around the same percentage. The critical question involves the extent to which the increase in the overall real-wage persists into the long-run.

In the simulations whose results are provided in this paper, we assume that enough of the initial overall real-wage increase is removed to ensure that there is no lasting effect of the pay-equity measures on the overall level of employment at the national level. Alternative approaches might involve:

- no ultimate impact on the national male employment level;
- no ultimate impact on the national female employment level;
- a specified proportion of those who lose their jobs in the short-term leave the labour market;
- a specified overall real-wage legacy.

While it would have been desirable if time and resources had allowed us to examine each of these approaches, the assumptions used in this paper simulations represent a legitimate

[15] That is, in the case of a 1 per cent wage rise to all female-dominated occupations.

approach. Under these assumptions we, essentially, are examining the pay-equity measures as a long-run change in the *relative* prices of (regionally-specified) labour types.[16]

The key assumptions underlying the long-run simulations are:

- The pay-equity measures have no long-term impact on national employment;
- The pay-measures have only a limited effect on interstate wage differentials, with persons moving between states to remove any disturbance to differentials beyond the initial pay changes;
- No change in the real rate of return on capital - together with the above labour market assumptions this determines the change in the national capital stock;
- Regional governments keep their nominal borrowing requirements constant by allowing their current consumption expenditure to vary;
- Australia's trade balance remains constant with the national average propensity to consume adjusting. It is assumed that the appropriate adjustment is achieved via a movement in interest rates.[17]

The usual justification for the last assumption is that in the long-run the Commonwealth Government is able to anticipate any change in the demand for overseas borrowing and act to constrain changes in the trade balance. As with the short-run, the nominal exchange rate is the numeraire and it is assumed that the rate of technical change is unaffected by the pay measures.

The long-run rigidity of national employment is realised through an overall movement in the national real wage. This contrasts with the short run where the only shift in the national real wage is that which results from the immediate change in nominal wages of the relevant female-intensive occupations in NSW. Thus, in the short-run nominal wages, after the initial shock, move only in line with changes in the *national* consumer price index.

In the long-run, as in the short-run, the initial increase in the nominal wage(s) of the relevant female-intensive NSW occupation(s) translates into an immediate increase in their real wage. For the short-run simulations this real wage increase is maintained (in terms of the national cpi) over the one to two year solution period. However, in the long-run, in order to remove eventually the disturbance in the level of employment nationally, all real wages adjust across-the-board. Thus, the female-intensive occupations in NSW which received the wage rise will find *some* of that real-wage increase eroded in the long term, while for all other occupations in NSW, and all workers in RoA, the real wage will decline relative to what would have been the case in the absence of the pay-equity measures. The real wage boost (in national cpi terms) of the first group of occupations relative to the other two is retained into the long-run in percentage-points terms.

3.3 Simulation Results

3.3.1 Introduction

[16] As we shall see in section 3.3, there still remains, in the long-run, a slight upward shift in the national real wage, a benefit from the compositional shift in wage rates between industries.

[17] Such a long-term outcome may be the result of Commonwealth monetary policy or it may occur via shifts in the supply of capital schedule. An alternative closure would be to keep the balance of trade constant via Commonwealth fiscal policy. It turns out that the long-run results would differ little from those presented here under such an alternative closure.

In this section, results are presented for the pay-equity simulations conducted under the assumptions outlined in the previous section. The assumptions should be borne continuously in mind when examining the results presented below.

All results reported in this section are deviations caused by the pay-equity measures from what otherwise would have been the case at the end of the relevant solution period.

3.3.2 Across-the-board Measures

3.3.2.1 Broad Effects

The macroeconomic effects of the two general pay-equity measures are shown in Table 1. The last two columns of the table are merely a multiple of the first two columns. We will thus confine our explanation to the two right-hand columns since they follow exactly the same pattern as the first two columns, but contain figures virtually three times as large.[18]

Table 1: Macroeconomic Effects of Across-the-Board Pay-Equity Measures

Percentage Change Variable		*Increase in wage to all female-dominated occupations:*			
		1 per cent wage increase		*1 percentage point closure of gender wage gap*	
		Short-run	Long-run	Short-run	Long-run
Real GDP	-NSW	-0.12	-0.06	-0.36	-0.18
	-Aust	-0.05	0.01	-0.15	0.02
Employment	-NSW	-0.17	-0.09	-0.50	-0.27
	-Aust	-0.10	0.00	-0.30	0.00
Capital Stock	-NSW	0.00	0.01	0.00	0.02
	-Aust	0.00	0.04	0.00	0.13
Real Consumption	-NSW	-0.07	-0.04	-0.21	-0.11
	-Aust	-0.03	0.01	-0.09	0.02
Real Investment	-NSW	0.00	0.01	0.00	0.03
	-Aust	0.00	0.04	0.00	0.11
Balance of trade ($b)	-NSW	-0.06	0.00	-0.18	0.00
	-Aust	-0.11	0.00	-0.34	0.00
Real Deficit ($b)	-NSW	0.03	0.00	0.09	0.00
	-Aust	0.05	0.00	0.14	0.00
all govts		0.09	0.00	0.27	0.00
Consumer price index	-NSW	0.22	0.12	0.66	0.37
	-Aust	0.12	0.03	0.36	0.08
Real wage	-NSW	0.14	0.09	0.42	0.27
	-Aust	0.10	0.01	0.30	0.04

Note: All results in percentage form unless indicated. NSW trade balance covers interstate and overseas trade.

Looking at the short-run effects first it can be seen that a pay-equity measure which reduces the gender-wage gap by one percentage point results in decreased economic activity and

[18] The exact scaling factor is 2.99. Note that we ignore trivial linearization errors.

induces a rise in the consumer price index.[19] Nationally, GDP is projected to be 0.15 per cent lower than what otherwise would have been the case without the measure, while NSW's gross state product is down by over a third of a per cent.

With capital stocks fixed in the short-run, employment is projected to be affected to a much worse extent than GDP or, in the case of NSW, than GSP. NSW employment is projected to be half a per cent lower in the short term as a result of the pay-equity measure, while Australian employment is down 0.3 per cent. However, real consumption is down by only around 0.2 per cent in NSW due to the effects of the higher real wage to the female-intensive occupations.[20]

Turning to the long-run results for the country as a whole, we see that the deleterious impacts of the pay-equity measures are projected to dissipate in the long-term. In line with our labour-market assumptions, real wages are adjusted to allow employment to increase. While, NSW female-intensive occupations keep most of their real wage rise, the real wage is projected to fall for male-dominated occupations in NSW and for all occupations in RoA.

Employment is still projected to be significantly down in NSW (by 0.27 per cent), but with a much smaller decline in real household consumption, so that NSW households are likely to be better off in terms of *private* consumption per capita from the long-term consequences of pay-equity. Unemployment in the State is unaffected, as NSW's population growth rate is slightly less than what otherwise would have occurred.[21]

At the national level, a small increase in GDP is projected for the long-run. This is due to a slight increase in the capital-intensity of the economy in the long-run as a result of the pay-equity measures. As we shall see from our examination of the industry results below, the long-term effects of the measures, under our labour-market scenario, is to most advantage, by and large, industries whose output is reasonably highly traded at the expense of industries that, generally speaking, face less foreign competition for their output. In terms of this stylised result, the relative cost shift tends to bring more of a price response for the contracting industries and more of a quantity response for the expanding industries. This acts to retard the fall in the general real wage required to eliminate the long-run impact on total employment. One twenty-fifth of a per cent rise in the real wage is still maintained in the long-run.[22]

The slightly positive real-wage effect causes some degree of capital-labour substitution. This, together with a change in the composition of output towards industries that overall are somewhat more capital-intensive than the less-advantaged industries, leads to a slightly more

---

[19] It is assumed that there is no monetary policy reaction to the upward pressure on the cpi. This would appear a reasonable assumption for a shock to the economy which is projected also to reduce activity.

[20] It will be noticed in the third column of Table 1 that the NSW real wage is only 0.12 percentage points above the national real wage. The closeness results from the NSW real wage figure involving the NSW cpi as a deflator while the Australian real wage is of course calculated on the basis of the national cpi. It can be seen from column 3 of Table 1 that the NSW cpi is projected to increase by about an additional 0.3 percentage points than the national cpi. This reduces the gap between the NSW real-wage change and that for Australia as a whole.

[21] This reflects the assumption that interstate migration rates adjust in the long-run to equalise regional unemployment rates, or at least to maintain the original pattern of disparities. However, econometric evidence suggests such a mechanism acts slowly (see Groenewold, 1997).

[22] It should be remembered though that the real wage impact is very uneven across occupations, with NSW female-dominated occupations ultimately experiencing a real-wage-increase of almost two and three quarters per cent, while all other NSW and RoA occupations are projected to experience a real wage fall of a bit over a quarter of a per cent.

capital-intensive economy in the long-run. While labour input is fixed in aggregate, capital stocks are projected to increase by 0.13 per cent . This gives rise to the small increase in real GDP.

3.3.2.2 Industry Results

Table 2 shows that in the short-run virtually all industries in NSW are projected to contract as a result of the pay rise to all female-dominated occupations in the State. There is a wide dispersion in the individual industry results, however, with 13 industries contracting by more than one per cent, while 25 industries are projected to contract by less than 0.2 per cent.

It might be expected that the pattern of industry effects would be in line with the degree of female-intensive occupations in industry wage-bills. However, the results show little conformity with such a pattern, particularly in the short run. A number of other key factors come into play. Firstly, industry costs are affected more by the proportion of female-dominated labour costs in total costs rather than in total *wage* costs. Secondly, the degree to which industry outputs are affected is highly dependent on their elasticity of demand and elasticity of supply (see Dixon, Madden and Peter, 1993, p.370). Thirdly, inter-industry linkages play a role for certain industries.

Taking into account the effects of the pay-equity measures on total industry costs often acts, however, in the direction of our prior expectations. For instance, the Education industry for Australia as a whole in 1993-94 had almost 82 per cent of its total costs made up of labour costs, compared with the all-industry average of a little more than 25 per cent. This means that Education has only a low share of fixed capital which makes for a very elastic short-run supply curve for this industry. However, the demand curve for "government" industries, like Education,[23] is very inelastic, reflecting the assumption that real government consumption of each commodity/industry is fixed in the short-run, with the extra wage costs adding to the NSW government deficit - projected to rise by $87 million (1993-94 prices) in the first column of Table 1.[24] The industry with the highest percentage in female-dominated occupations is Health (66 per cent). In the short-run output is projected to contract in this industry in NSW by 0.64 per cent, within the broad neighbourhood of the projected percentage contraction in NSW GSP of 0.36 per cent,[25] and well down in the order of negatively-affected industries (Health is the 46th worst affected industry in NSW in the short-run). The Education industry also has a higher than average percentage of its wage bill (36 per cent) in female-dominated occupations.[26] However, it ranks only 90th in terms of negatively-affected NSW industries, being projected to contract by 0.29 per cent.

In the short-run all industries face nominal wage increases (although not all of the same order) which, given the model's assumption of zero-pure profits, leads to price increases. For a given nominal price increase the industries most negatively affected will be those which face the most elastic demand, namely the traded-goods industries, particularly those which are export oriented.[27] This explains an industry such as Cotton Ginning (Industry 32) which ranks only

[23] Not all of Education's output is produced by the public sector, with only two-thirds of its output being "sold" to Government final demand. Thus, Education's demand curve is not *completely* elastic.

[24] The NSW government's price deflator is projected to increase by 1.1 per cent.

[25] The dispersion in the projected changes in industry output is over 3 percentage points for NSW.

[26] Education actually has the highest proportion for all industries of the wage-bill accounted for by female-intensive employees. However, since secondary school teachers is only a marginal female-intensive occupation, the Education industry ranks only 15th in the list of female-dominated industries.

[27] Assuming no change to the numeraire (the nominal exchange rate).

89th in terms of female-dominated share of the wage bill, being projected to suffer the fourth largest output fall nationally - by 0.84 per cent compared with a projected decline in national GDP of 0.15 per cent. For NSW, the degree of competitiveness with RoA also becomes a factor. Motor Vehicles is the worst affected NSW industry in the short-run, reflecting an interstate substitution elasticity of 7.8.[28]

Also, since it is in New South Wales where the pay increases are occurring the importance of the degree of industry employment in female-dominated occupations is increased when looking at an industry's output result for the region, rather than for the country as a whole. For the short-run, Health ranked 63rd most adversely-affected industry for the *nation as a whole*, compared with its short-run ranking of 46th within NSW.

In the long-run, industries with higher than average female-intensity are more adversely affected than in the short-run. The NSW government's real expenditure, for instance, is allowed to decline to remove any deterioration in the State's budget deficit. This affects all industries with high state government expenditure, including Health which becomes the 9th worst affected industry in NSW and Education the 35th worst.

With the male-dominated occupations in NSW and all occupations in RoA receiving a real wage cut, some 80 industries nationally are projected to experience output increases from pay-equity under our assumed long-run settings. This is the case for only 8 NSW industries, reflecting that State's loss of competitiveness against RoA.

The most positively-affected industries nationally contain a heavy representation of industries which are export-oriented or export-related. This is not the case for NSW, however, where the real-wage cut for male-intensive occupations is generally not sufficient to offset the other cost increases in that state. For instance, Ferrous Metal Ores, which is projected to expand by 0.4 per cent nationally, is projected to contract by 0.8 per cent in New South Wales. For some industries, the problem is particularly compounded by a damaging loss of interstate competitiveness.[29]

3.3.2.3 Occupational Results

The effects of the pay-equity measures on the 76 occupations are shown in Table 3. An examination of the fifth column of this table reveals that the least worst-affected occupations in the short-run, are the eight male-intensive ones and fifteen of those occupations which, while female intensive, are not female dominated (hereafter referred to as mildly female intensive).

[28] This very high elasticity was in the existing M2R (NSW) parameter file and its likely veracity has not been examined for the current exercise.

[29] While NSW interstate trade balance suffers considerably from a loss of competitiveness, it is helped by increased demand from RoA and an improvement in NSW's terms of trade.

Table 2: Effects of Across-the-Board Pay-Equity Measures on NSW and Australian Industry Output

Industry Output Percentage Change	*Increase in wage to all female-dominated occupations:*							
	1 per cent wage increase				*1 percentage point closure of gender wage gap*			
	Short-run		Long-run		Short-run		Long-run	
	NSW	Aust	NSW	Aust	NSW	Aust	NSW	Aust
1 Sheep	-0.34	-0.13	-0.05	0.02	-1.02	-0.39	-0.14	0.06
2 Wheat	-0.28	-0.12	-0.05	0.01	-0.85	-0.35	-0.15	0.03
3 Barley	-0.05	-0.05	-0.10	0.00	-0.14	-0.15	-0.28	-0.01
4 Other Grain	-0.30	-0.14	-0.03	0.00	-0.91	-0.42	-0.08	0.01
5 Meat Cattle	-0.27	-0.13	-0.02	0.02	-0.81	-0.37	-0.07	0.07
6 Milk Cattle	-0.11	-0.08	-0.05	0.03	-0.34	-0.24	-0.15	0.10
7 Pigs	-0.16	-0.08	-0.04	0.03	-0.49	-0.23	-0.11	0.10
8 Poultry	-0.38	-0.19	-0.13	-0.05	-1.14	-0.58	-0.38	-0.14
9 Other Agricultural Exports	-0.07	-0.08	0.00	0.06	-0.20	-0.25	0.01	0.17
10 Other Agricultural Imports	-0.13	-0.10	-0.01	0.02	-0.37	-0.29	-0.04	0.05
11 Services To Agriculture	-0.21	-0.08	-0.09	0.00	-0.61	-0.24	-0.27	0.01
12 Forestry & Logging	-0.11	-0.05	-0.07	0.03	-0.33	-0.16	-0.21	0.09
13 Fishing & Hunting	-0.13	-0.11	-0.04	0.02	-0.38	-0.34	-0.11	0.07
14 Ferrous Metal Ores	-0.58	-0.11	-0.26	0.12	-1.75	-0.32	-0.77	0.36
15 Non-Fer Metal Ores	-0.27	-0.11	-0.16	0.10	-0.82	-0.34	-0.48	0.30
16 Black Coal	-0.26	-0.16	-0.06	0.03	-0.78	-0.48	-0.19	0.08
17 Oil Gas Brown Coal	-	-0.02	-	0.07	-	-0.05	-	0.21
18 Other Minerals	-0.24	-0.15	-0.13	0.01	-0.72	-0.44	-0.38	0.02
19 Services to Mining	-0.44	-0.09	-0.28	0.06	-1.32	-0.27	-0.84	0.19
20 Meat Products	-0.15	-0.12	-0.05	0.02	-0.46	-0.37	-0.16	0.05
21 Milk Products	-0.11	-0.08	-0.05	0.01	-0.32	-0.24	-0.14	0.02
22 Fruit & Vegetable Products	-0.10	-0.07	-0.04	0.00	-0.29	-0.20	-0.13	0.00
23 Margarine, Oils & Fats	-0.27	-0.15	-0.12	-0.02	-0.82	-0.44	-0.36	-0.06
24 Flour Mill & Cereals	-0.22	-0.17	-0.10	-0.03	-0.67	-0.50	-0.31	-0.08
25 Bread,Cakes,Biscut	-0.03	-0.02	-0.01	0.00	-0.09	-0.07	-0.02	0.01
26 Confectionery & Cocoa	-0.22	-0.13	-0.12	-0.05	-0.65	-0.40	-0.36	-0.14
27 Other Food Products	-0.13	-0.13	-0.04	0.02	-0.38	-0.38	-0.13	0.07
28 Non-alcoholic Beverages	-0.04	-0.02	-0.01	0.00	-0.12	-0.07	-0.04	0.01
29 Beer & Malt	-0.10	-0.05	-0.03	0.01	-0.29	-0.16	-0.09	0.02
30 Other Alcohol	-0.26	-0.11	-0.17	0.04	-0.79	-0.34	-0.50	0.11
31 Tobacco Products	-0.04	-0.06	0.00	0.01	-0.13	-0.19	-0.01	0.04
32 Cotton Ginning etc	-0.38	-0.28	-0.15	-0.02	-1.14	-0.84	-0.46	-0.05
33 Man-made Fbrs,Yrns,Fabs	-0.38	-0.20	-0.23	0.01	-1.14	-0.59	-0.69	0.03
34 Cotton Yarns etc	-0.65	-0.18	-0.46	0.01	-1.94	-0.53	-1.37	0.02
35 Worsted & Woolen Yarns,Fabs	-0.33	-0.10	-0.18	0.02	-0.98	-0.30	-0.53	0.05
36 Textile Finishing	-0.29	-0.09	-0.22	0.00	-0.86	-0.27	-0.67	-0.01
37 Felt,Floor Cvrgs	-0.18	-0.11	-0.09	-0.01	-0.55	-0.33	-0.26	-0.04
38 Other Text Prods	-0.28	-0.18	-0.16	-0.06	-0.84	-0.53	-0.47	-0.17
39 Knitting Mills	-0.24	-0.13	-0.18	-0.05	-0.72	-0.38	-0.54	-0.15
40 Clothing	-0.23	-0.11	-0.17	-0.04	-0.69	-0.33	-0.50	-0.11
41 Footwear	-0.26	-0.15	-0.08	0.01	-0.78	-0.45	-0.23	0.04
42 Sawmill Products	-0.17	-0.11	-0.08	0.05	-0.52	-0.32	-0.24	0.16
43 Veneers etc	-0.16	-0.07	-0.07	0.03	-0.47	-0.20	-0.20	0.08

Table 2 (continued)

Industry Output Percentage Change	*Increase in wage to all female-dominated occupations:*							
	1 per cent wage increase				*1 percentage point closure of gender wage gap*			
	Short-run		Long-run		Short-run		Long-run	
	NSW	Aust	NSW	Aust	NSW	Aust	NSW	Aust
44 Joinery etc NEC	-0.08	-0.04	-0.03	0.02	-0.25	-0.13	-0.10	0.05
45 Furniture & Mattrs	-0.09	-0.06	-0.03	0.02	-0.27	-0.19	-0.08	0.06
46 Pulp, Paper etc	-0.18	-0.09	-0.11	0.01	-0.54	-0.27	-0.33	0.04
47 Bags,cntainers etc	-0.15	-0.08	-0.06	0.02	-0.45	-0.24	-0.19	0.06
48 Paper Products NEC	-0.14	-0.07	-0.08	-0.01	-0.41	-0.21	-0.24	-0.02
49 Publish'g & Print	-0.12	-0.07	-0.06	0.00	-0.35	-0.21	-0.19	-0.01
50 Paper Stat. etc	-0.15	-0.07	-0.09	0.00	-0.44	-0.22	-0.28	0.01
51 Chem Fertilizers	-0.37	-0.27	-0.11	-0.05	-1.12	-0.80	-0.34	-0.16
52 Other Basic Chems	-0.31	-0.17	-0.15	0.00	-0.93	-0.51	-0.46	-0.01
53 Paints	-0.20	-0.11	-0.10	-0.01	-0.60	-0.33	-0.31	-0.02
54 Pharm,Vet,Pestcds	-0.31	-0.22	-0.17	-0.08	-0.91	-0.67	-0.52	-0.25
55 Soap,Othr Detrgnt	-0.16	-0.09	-0.09	-0.03	-0.49	-0.28	-0.26	-0.10
56 Cosmetics etc	-0.16	-0.10	-0.08	-0.03	-0.47	-0.30	-0.25	-0.09
57 Othr Chem Products	-0.26	-0.16	-0.13	-0.02	-0.77	-0.49	-0.38	-0.06
58 Petrol Refining	-0.22	-0.12	-0.08	-0.01	-0.65	-0.36	-0.25	-0.02
59 Petrol/Coal Products	-0.15	-0.10	-0.01	0.02	-0.46	-0.29	-0.04	0.05
60 Glass & Products	-0.22	-0.12	-0.11	-0.01	-0.66	-0.37	-0.33	-0.04
61 Clay Products	-0.12	-0.06	-0.05	0.02	-0.36	-0.18	-0.14	0.07
62 Cement	-0.07	-0.03	-0.01	0.03	-0.21	-0.08	-0.04	0.09
63 Ready Mix Concrete	0.00	0.00	0.02	0.03	-0.01	-0.01	0.07	0.10
64 Concrete Products	-0.07	-0.02	-0.02	0.02	-0.19	-0.07	-0.07	0.07
65 Othr N-Met Min Prd	-0.15	-0.09	-0.06	-0.01	-0.44	-0.27	-0.18	-0.02
66 Basic Iron & Steel	-0.22	-0.20	-0.04	0.00	-0.67	-0.59	-0.11	0.00
67 Non-Fer Met Prods	-0.30	-0.19	-0.08	0.02	-0.90	-0.57	-0.25	0.07
68 Structural Metal	-0.06	-0.04	-0.03	0.03	-0.19	-0.11	-0.08	0.09
69 Sheet Metal Prods	-0.21	-0.14	-0.10	-0.01	-0.64	-0.42	-0.30	-0.02
70 Other Metal Prods	-0.28	-0.16	-0.13	-0.01	-0.84	-0.48	-0.39	-0.03
71 Motor Vehicles etc	-1.04	-0.24	-0.65	-0.04	-3.12	-0.73	-1.93	-0.13
72 Ships & Boats	-0.17	-0.13	-0.14	-0.01	-0.51	-0.39	-0.41	-0.03
73 Railway etc	-0.06	-0.06	-0.01	0.04	-0.17	-0.17	-0.03	0.13
74 Aircraft	-0.29	-0.22	-0.11	-0.04	-0.86	-0.66	-0.32	-0.12
75 Phot Equipment etc	-0.28	-0.20	-0.15	-0.06	-0.84	-0.59	-0.45	-0.17
76 Electronic Equip	-0.26	-0.16	-0.12	0.00	-0.77	-0.49	-0.36	0.00
77 Fridges, H-Hold Ap	-0.18	-0.13	-0.06	-0.02	-0.53	-0.38	-0.19	-0.06
78 Othr Elect Equip	-0.20	-0.15	-0.09	-0.04	-0.59	-0.45	-0.27	-0.11
79 Ag Machinery	-0.08	-0.08	-0.04	-0.01	-0.23	-0.25	-0.12	-0.04
80 Constr Machinery	-0.11	-0.11	-0.03	-0.02	-0.34	-0.34	-0.08	-0.05
81 Othr Mach/Equip	-0.08	-0.07	-0.04	0.03	-0.25	-0.21	-0.11	0.10
82 Leather Products	-0.58	-0.29	-0.27	-0.01	-1.75	-0.86	-0.81	-0.03
83 Rubber Products	-0.31	-0.16	-0.14	-0.01	-0.93	-0.49	-0.43	-0.04
84 Plastic Products	-0.26	-0.14	-0.13	-0.01	-0.77	-0.41	-0.39	-0.02
85 Signs,Advertising	-0.27	-0.12	-0.14	-0.01	-0.80	-0.35	-0.41	-0.03
86 Othr Manufacturing	-0.37	-0.20	-0.20	-0.02	-1.11	-0.60	-0.58	-0.06
87 Electricity	-0.09	-0.06	-0.04	0.01	-0.27	-0.19	-0.11	0.04
88 Gas	-0.14	-0.07	-0.06	0.02	-0.42	-0.20	-0.17	0.07

Table 2 (continued)

Industry Output Percentage Change	*Increase in wage to all female-dominated occupations:*							
	1 per cent wage increase				*1 percentage point closure of gender wage gap*			
	Short-run		Long-run		Short-run		Long-run	
	NSW	Aust	NSW	Aust	NSW	Aust	NSW	Aust
89 Water etc	-0.06	-0.04	-0.02	0.02	-0.17	-0.11	-0.05	0.07
90 Res Build'g Constr	0.00	0.00	0.01	0.04	0.00	0.00	0.02	0.13
91 Other Construction	-0.01	-0.01	0.01	0.03	-0.02	-0.02	0.04	0.10
92 Wholesale Trade	-0.10	-0.07	-0.03	0.04	-0.30	-0.20	-0.08	0.12
93 Other Retail Trade	-0.06	-0.03	-0.03	0.01	-0.19	-0.08	-0.08	0.03
94 Motor Vehicle Dealers	-0.07	-0.03	-0.03	0.00	-0.20	-0.10	-0.09	0.01
95 Mechanical Repairs	-0.07	-0.06	-0.01	0.01	-0.21	-0.17	-0.03	0.03
96 Other Repairs	-0.10	-0.06	-0.03	0.02	-0.30	-0.18	-0.10	0.05
97 Road Transport	-0.07	-0.05	-0.02	0.04	-0.21	-0.16	-0.07	0.13
98 Rail Transport	-0.03	-0.05	-0.01	0.05	-0.09	-0.14	-0.03	0.15
99 Water Transport	-0.70	-0.32	-0.38	-0.05	-2.09	-0.95	-1.13	-0.16
100 Air Transport	-0.27	-0.16	-0.14	-0.01	-0.82	-0.46	-0.40	-0.04
101 Othr Trnsprt,Store	-0.70	-0.68	-0.18	0.02	-2.08	-2.03	-0.53	0.05
102 Communication	-0.16	-0.08	-0.07	0.01	-0.48	-0.25	-0.21	0.03
103 Central Bank	-0.05	-0.03	0.01	0.03	-0.15	-0.10	0.04	0.09
104 Other Banks	-0.08	-0.04	-0.02	0.03	-0.23	-0.12	-0.06	0.08
105 Non-bank Finance	-0.13	-0.05	-0.07	0.04	-0.39	-0.16	-0.21	0.13
106 Services Fin/Invest	-0.09	-0.06	-0.04	0.01	-0.26	-0.18	-0.12	0.02
107 Investment	-0.09	-0.06	-0.04	0.01	-0.26	-0.18	-0.13	0.02
108 General/Life Insurance	-0.06	-0.06	-0.03	0.05	-0.19	-0.18	-0.09	0.16
109 Health Insurance	-0.13	-0.08	-0.04	0.03	-0.40	-0.23	-0.13	0.08
110 Super/Ins Services	-0.18	-0.08	-0.09	0.01	-0.55	-0.24	-0.27	0.03
111 Property Services - Trusts	-0.12	-0.09	-0.05	0.00	-0.37	-0.26	-0.15	0.01
112 Plant Hire leasing	-0.12	-0.08	-0.05	0.01	-0.35	-0.24	-0.14	0.02
113 Othr Business Srvs	-0.11	-0.08	-0.06	0.00	-0.34	-0.24	-0.17	0.00
114 Ownership of Dwlgs	0.00	0.00	0.01	0.04	0.00	0.00	0.02	0.13
115 Public Admin	-0.01	-0.01	-0.11	-0.02	-0.03	-0.03	-0.32	-0.06
116 Defence	-0.01	-0.01	-0.12	-0.03	-0.03	-0.02	-0.34	-0.09
117 Health	-0.21	-0.09	-0.20	-0.05	-0.64	-0.27	-0.61	-0.15
118 Education etc	-0.10	-0.04	-0.12	-0.02	-0.29	-0.12	-0.35	-0.06
119 Garbage Srvs	-0.09	-0.04	-0.09	-0.01	-0.26	-0.11	-0.27	-0.03
120 Police/Fire/Prisons	0.00	-0.01	-0.11	-0.03	0.00	-0.02	-0.34	-0.08
121 OthrCommunitySrvs	-0.07	-0.03	-0.08	-0.01	-0.22	-0.10	-0.24	-0.03
122 Lotteries	-0.04	-0.03	0.01	0.04	-0.11	-0.08	0.02	0.12
123 Other Gambling	-0.06	-0.03	-0.01	0.03	-0.19	-0.10	-0.03	0.09
124 Sport/Entertainment etc	-0.06	-0.05	-0.03	0.00	-0.18	-0.14	-0.08	0.01
125 Pubs, Taverns and Bars	-0.11	-0.08	-0.04	0.04	-0.34	-0.24	-0.12	0.11
126 Accommodation	-0.15	-0.09	-0.06	0.02	-0.45	-0.27	-0.19	0.06
127 Cafes and Restaurants	-0.17	-0.10	-0.07	0.02	-0.51	-0.29	-0.20	0.07
128 Clubs (Hospitality)	-0.12	-0.09	-0.04	0.03	-0.37	-0.26	-0.13	0.08
129 Personal Services	-0.27	-0.13	-0.17	-0.04	-0.79	-0.38	-0.52	-0.11

In the short-run the worst-affected occupation in NSW is Travel agents. This is a moderately-high female-intensive occupation (74 per cent female-intensity in terms of persons, 67 per cent in terms of the wage-bill for the occupation in NSW), with over 80 per cent of its members employed in the Other transport and storage industry. This industry has a quite high labour-intensity giving it a relatively elastic short-run supply curve. Since induced-demand contractions as well as cost increases are outcomes of the pay-equity measures, the Other transport and storage industry is one of the worst-affected NSW industries in the short-run. Due, however, to some substitution away from the female-dominated occupations within Other transport and storage, the industry contracts by a bit under 2 per cent, compared with a contraction of over 3 per cent by the Travel agents occupation.

The two worst-affected mildly female-intensive occupations in NSW in the short-run are Yarn production machine operators and Travel stewards. Both occupations are affected by their heavy use in adversely-affected industries. For instance, a third of the former occupation is employed by the badly-affected Cotton Ginning industry.

Eighty-five per cent of the latter occupation are employed in the Air transport industry which is in the top fifth of industries ranked down from the worst affected industry. Nevertheless, Travel stewards is still one of the least affected of those occupations which are projected to contract (relative to their level of employment in the absence of the pay-equity measure).

3.3.2.4 Aggregate Gender Effects

The overall effect on female employment from the pay-equity measures can be seen in Table 4. While the measures involve equal-pay increases across genders within occupations, the pay increases in the main go to females, since sixty per cent of NSW female earnings is accounted for by female-dominated occupations while only 9 per cent of male earnings in NSW relate to these occupations. This, however, also means that the negative employment effects are felt more by females. This would appear to occur not so much through a relative output contraction of industries which are heavy users of female-intensive occupations, but mostly through substitution away from female-intensive occupations by individual industries.

When considering these results it should be remembered that the exact size of the shares of employees in female-intensive occupations is likely to be affected by occupational aggregation. Greater disaggregation of occupations (and of industries) would have some bearing on the magnitude of effects. In section 3.3.3 we note that the occupational substitution may be serving the place of some industrial composition changes which would have occurred if there had been even finer industry disaggregation in the model.

We see from the third column of Table 4 that, even in the short-run where industries which are substantial users of female-intensive occupations are not so negatively affected as in the long-run, female employment in NSW is affected over twice as much as male employment.

Table 3: Effects of Across-the-Board Pay-Equity Measures on Occupations in NSW and Australia as a whole

	Employment in occupation *Percentage Change*	*Increase in wage to all female-dominated occupations:*							
		1 per cent wage increase				*1 percentage point closure of gender wage-gap*			
		Short-run		Long-run		Short-run		Long-run	
		NSW	Aust	NSW	Aust	NSW	Aust	NSW	Aust
1	Directors of nursing	-0.35	-0.18	-0.35	-0.15	-1.06	-0.54	-1.06	-0.45
2	Restaurant & catering managers, etc.	-0.01	-0.03	0.03	0.04	-0.03	-0.10	0.08	0.12
3	Other managers and professionals	-0.08	-0.07	0.02	0.04	-0.25	-0.22	0.05	0.12
4	Medical testing professionals	0.03	-0.01	0.03	0.03	0.09	-0.02	0.09	0.09
5	Occupational therapists	-0.34	-0.12	-0.36	-0.08	-1.02	-0.35	-1.06	-0.25
6	Physiotherapists	-0.35	-0.12	-0.35	-0.08	-1.05	-0.36	-1.06	-0.24
7	Speech pathologists	-0.34	-0.11	-0.36	-0.08	-1.02	-0.33	-1.06	-0.24
8	Podiatrists	-0.36	-0.19	-0.35	-0.15	-1.07	-0.56	-1.05	-0.45
9	Radiographers	-0.36	-0.15	-0.35	-0.10	-1.08	-0.43	-1.05	-0.31
10	Other health practitioners	-0.36	-0.16	-0.35	-0.12	-1.08	-0.49	-1.06	-0.37
11	Pre-primary school teachers	-0.34	-0.12	-0.37	-0.10	-1.01	-0.36	-1.10	-0.30
12	Primary school teachers	-0.35	-0.10	-0.37	-0.08	-1.05	-0.31	-1.12	-0.24
13	Secondary school teachers	0.04	0.00	0.02	0.02	0.12	0.01	0.05	0.07
14	Special education teachers	-0.35	-0.13	-0.37	-0.12	-1.04	-0.40	-1.11	-0.35
15	TAFE teachers	0.04	0.01	0.02	0.02	0.11	0.02	0.05	0.07
16	Extra-systemic teachers	0.01	-0.01	0.02	0.03	0.03	-0.03	0.05	0.08
17	Social workers	-0.32	-0.11	-0.36	-0.08	-0.97	-0.32	-1.07	-0.25
18	Counsellors	-0.33	-0.12	-0.36	-0.10	-1.00	-0.37	-1.08	-0.30
19	Public relations officers	-0.06	-0.08	0.02	0.04	-0.19	-0.23	0.05	0.12
20	Personnel specialist	0.01	-0.03	0.01	0.03	0.02	-0.09	0.03	0.09
21	Psychologists	-0.34	-0.12	-0.36	-0.09	-1.01	-0.36	-1.08	-0.28
22	Education researchers, etc.	-0.35	-0.14	-0.37	-0.11	-1.04	-0.41	-1.11	-0.34
23	Librarians	-0.36	-0.14	-0.38	-0.11	-1.07	-0.41	-1.12	-0.32
24	Other professionals	-0.04	-0.05	0.02	0.04	-0.12	-0.15	0.05	0.11
25	Medical technical officers, etc.	-0.39	-0.14	-0.36	-0.09	-1.16	-0.41	-1.09	-0.26
26	Registered nurses	-0.36	-0.14	-0.35	-0.10	-1.07	-0.43	-1.05	-0.31
27	Welfare para-professionals	-0.32	-0.13	-0.36	-0.11	-0.96	-0.38	-1.06	-0.32
28	Child care co-ordinators	-0.32	-0.11	-0.36	-0.09	-0.96	-0.33	-1.07	-0.27
29	Other para-professionals	-0.08	-0.08	0.01	0.04	-0.23	-0.24	0.02	0.11
30	Garment tradespersons	-0.39	-0.16	-0.33	-0.09	-1.16	-0.48	-0.98	-0.26
31	Craftworkers	-0.45	-0.19	-0.38	-0.09	-1.35	-0.56	-1.13	-0.27
32	Hairdressers	-0.50	-0.25	-0.39	-0.13	-1.51	-0.74	-1.18	-0.40
33	Other Tradespersons	-0.08	-0.06	0.01	0.04	-0.23	-0.19	0.03	0.12
34	Office secretaries and stenographers	-0.42	-0.23	-0.36	-0.14	-1.27	-0.69	-1.08	-0.41
35	Typists and typist-clerks	-0.38	-0.18	-0.35	-0.11	-1.12	-0.53	-1.06	-0.32
36	Word processing operators	-0.38	-0.17	-0.36	-0.11	-1.13	-0.51	-1.08	-0.33
37	Data processing machine operators	-0.41	-0.19	-0.35	-0.10	-1.22	-0.57	-1.05	-0.30

Table 3 (continued)

Employment in occupation *Percentage Change*	*Increase in wage to all female-dominated occupations:*							
	1 per cent wage increase				*1 percentage point closure of gender wage-gap*			
	Short-run		Long-run		Short-run		Long-run	
	NSW	Aust	NSW	Aust	NSW	Aust	NSW	Aust
38 Business machine operators	-0.26	-0.12	-0.21	-0.03	-0.77	-0.36	-0.62	-0.09
39 Accounting clerks	-0.42	-0.19	-0.35	-0.09	-1.26	-0.58	-1.06	-0.28
40 Insurance and broking clerks	-0.37	-0.13	-0.31	-0.03	-1.10	-0.39	-0.94	-0.08
41 Library and filing clerks	-0.36	-0.17	-0.37	-0.13	-1.08	-0.50	-1.10	-0.39
42 Filing, sorting & copying clerks, nec	-0.35	-0.16	-0.32	-0.08	-1.03	-0.48	-0.96	-0.25
43 Receptionists and information clerks	-0.40	-0.17	-0.35	-0.09	-1.20	-0.52	-1.05	-0.26
44 Telephonists	-0.43	-0.20	-0.37	-0.10	-1.28	-0.60	-1.10	-0.31
45 Collections clerks	-0.37	-0.23	-0.33	-0.14	-1.11	-0.70	-0.99	-0.43
46 Teachers' aides	-0.35	-0.15	-0.37	-0.13	-1.04	-0.44	-1.12	-0.40
47 Personnel clerks	0.03	-0.01	0.02	0.03	0.09	-0.02	0.07	0.09
48 Legal and related clerks	0.02	-0.02	0.04	0.04	0.05	-0.05	0.12	0.12
49 Postal clerks and officers	-0.22	-0.13	-0.06	0.01	-0.65	-0.40	-0.19	0.03
50 Other clerks	-0.08	-0.09	-0.01	0.03	-0.25	-0.26	-0.02	0.10
51 Sales assistants	-0.34	-0.15	-0.29	-0.09	-1.02	-0.45	-0.87	-0.26
52 Tellers	-0.27	-0.14	-0.21	-0.03	-0.80	-0.43	-0.64	-0.10
53 Cashiers	-0.34	-0.14	-0.29	-0.08	-1.02	-0.43	-0.87	-0.24
54 Ticket salespersons	-0.56	-0.28	-0.41	-0.09	-1.68	-0.83	-1.21	-0.27
55 Bar attendants	-0.07	-0.08	0.03	0.05	-0.22	-0.24	0.07	0.16
56 Waiters and waitresses	-0.45	-0.21	-0.36	-0.08	-1.35	-0.63	-1.07	-0.23
57 Travel agents	-1.04	-0.90	-0.49	-0.16	-3.12	-2.69	-1.45	-0.49
58 Other salespersons	-0.01	-0.04	0.06	0.06	-0.02	-0.13	0.19	0.17
59 Child care, refuge and related workers	-0.34	-0.13	-0.36	-0.11	-1.03	-0.40	-1.08	-0.32
60 Enrolled nurses	-0.36	-0.13	-0.35	-0.09	-1.07	-0.40	-1.05	-0.28
61 Dental nurses	-0.36	-0.16	-0.35	-0.12	-1.08	-0.47	-1.05	-0.35
62 Home companions and aides	-0.37	-0.16	-0.36	-0.13	-1.11	-0.48	-1.08	-0.38
63 Travel stewards	-0.33	-0.26	-0.11	-0.03	-0.97	-0.78	-0.33	-0.08
64 Other personal service workers	-0.47	-0.23	-0.38	-0.10	-1.40	-0.68	-1.13	-0.30
65 Other sales & personal service	-0.05	-0.06	0.03	0.05	-0.15	-0.19	0.09	0.15
66 Yarn production machine operators	-0.36	-0.22	-0.12	0.01	-1.07	-0.66	-0.37	0.03
67 Textile sewing machinists	-0.43	-0.20	-0.35	-0.10	-1.30	-0.61	-1.06	-0.30
68 Shoemaking machine operators	-0.21	-0.13	-0.02	0.04	-0.62	-0.39	-0.07	0.11
69 Other machinery operators, drivers	-0.15	-0.11	-0.02	0.04	-0.46	-0.33	-0.06	0.12
70 Hand packers	-0.50	-0.29	-0.39	-0.16	-1.50	-0.86	-1.18	-0.48
71 Cleaners	-0.06	-0.06	0.01	0.03	-0.19	-0.18	0.02	0.09
72 Housekeepers	-0.43	-0.14	-0.36	-0.02	-1.29	-0.42	-1.09	-0.05
73 Laundry workers	-0.42	-0.16	-0.37	-0.08	-1.25	-0.46	-1.10	-0.24
74 Kitchen hands	0.00	-0.03	0.05	0.05	-0.01	-0.09	0.16	0.15
75 Ward helpers	-0.36	-0.14	-0.35	-0.10	-1.07	-0.42	-1.05	-0.30
76 Other labourers and related workers	-0.14	-0.10	-0.01	0.04	-0.41	-0.31	-0.04	0.11

Concentrating on the results for the more general pay-equity measure, we find that for Australia as a whole the short-run gap is not so wide and, indeed, in *absolute* numbers of persons, the projected contraction in national male employment is only just over twenty per cent greater than the contraction in national female employment. These employment effects by gender contrast markedly with the results presented by Bonnell (1987) who used the ORANI model to examine the short-run employment effects of equal pay for females. Bonnell found that equal pay resulted in an *absolute* employment change for males that was over seventy per cent greater than it was for females.

Bonnell (1987, p.347) notes that: "The share of males in this [employment] loss was 63 per cent, which aligns quite closely with their initial share of the overall workforce [in her database year] of 64.2 per cent". That is, the percentage change effect of equal pay on employment was nearly the same for both sexes.[30] As might be expected part of the difference between Bonnell's equal-pay results for inter-gender effects and our pay-equity results, comes from the different nature of the pay measures and the different time frames in which they were conducted.

Nevertheless, another key reason for the difference between this and the Bonnell study's results is a crucial difference in the treatment of inter-occupational substitution. In the present study all inter-occupational (CES) substitution elasticities are set at 0.389 for all regional industries. This is a standard setting which we maintained for this study. These substitution elasticities play a key role in determining our relative employment results between genders. In the Bonnell study these elasticities have no role to play. This occurs because she imposes her shocks at the industry, rather than the occupational level. Thus, her simulations are conducted as if gender and occupational shares of industry were technologically fixed. This was in line with her aim to isolate just the effects of equal-wage induced changes in industrial compensation on employment by gender.[31]

Table 4: Effects of Across-the-Board Pay-Equity Measures on Aggregate Employment by Gender

Employment Percentage Change		*Increase in wage of all female-dominated occupations:*			
		1 per cent wage increase		*1 percentage point closure of gender wage-gap*	
		Short-run	Long-run	Short-run	Long-run
Females	NSW	-0.26	-0.21	-0.79	-0.62
	RoA	-0.05	0.05	-0.16	0.14
	Aust	-0.13	-0.05	-0.40	-0.14
Males	NSW	-0.11	-0.03	-0.34	-0.08
	RoA	-0.07	0.06	-0.20	0.17
	Aust	-0.08	0.03	-0.25	0.08

[30] Bonnell used 1976 Census figures for employment by sex, occupation and industry. Using aggregate employment by gender data for that year, the percentage contraction in employment implied by the Bonnell results is about 7 per cent for both sexes.

[31] Thus for Bonnell employment data on sex, by occupation by industry was only important for correctly computing the size of the shock for the cost of a unit of labour in each industry.

Bonnell (1987, p.344) notes that her method abstracts from the possibility of industries partially offsetting "equal pay by substituting in favour of the relatively cheaper male employees". She goes on to say that: "To the extent that they actually did so, the results here may slightly overstate the response of the industry structure." While in this study we have taken such a substitution possibility into account, we have done no analysis as to whether the degree of substitutability we have allowed for is likely to be correct. Thus our results, and those of Bonnell, in relation to the inter-gender employment effects should be treated with caution.[32] The inter-occupational substitution elasticities question is taken up again in the next section when examining the results for a Hairdressers pay-equity measure.

3.3.2.5 Budgetary Effects

Finally, we see the effects of the across-the-board measure on some key elements of the governments' budgets in Table 5. It can be seen that in the short-run, by assumption, there is no change in any of the governments' real spending, with substantial increases in the NSW and Commonwealth governments' real borrowing requirements. In the long-run the Australian governments virtually eliminate the effect on their real deficit by cutting government expenditure. The NSW government cuts its real consumption in the long-run by just over 0.4 per cent (see last column of Table 5).

Table 5: Effects of General Pay-Equity Measures on Certain Government Variables

Percentage Change Variable		*Increase in wage of all female-dominated occupations:*			
		1 per cent wage increase		*1 percentage point closure of gender wage-gap*	
		Short-run	Long-run	Short-run	Long-run
Real State Government	NSW	-	-0.137	-	-0.410
Consumption	Aust	-	-0.007	-	-0.020
Real Federal Government	NSW	-	-0.054	-	-0.161
Consumption	Aust	-	-0.054	-	-0.161
Real State Govt Deficit ($b)	NSW	0.029	-0.002	0.087	-0.005
Real Federal Govt Deficit ($b)	Aust	0.048	..	0.143	..
Real (All) Govts Deficit ($b)	Aust	0.091	-0.002	0.271	-0.006

3.3.3 Individual Occupation Measures: Hairdressers and Librarians

In this section we provide reasonably detailed results for possible pay-equity measures for two illustrative individual occupations: Hairdressers and Librarians. The major long-run effects of the two occupation-specific pay-equity measures are shown in Table 6. These results are for a 5 per cent wage increase. This figure has been chosen merely as a useful example that may (up to a reasonable limit) be scaled to assess the effects of other sized pay-equity measures for the occupations in question.[33] No judgment is made in this paper as to what magnitude the actual pay equity measures might turn out to be.[34]

[32] One area of apparent agreement between the two studies is that industrial composition effects would seem to have had only a minor impact on the relative aggregate outcome for females and males in our study as well as in that of Bonnell.

[33] It should be noted that scaling up by too much will introduce linearisation errors.

[34] Figures are available on gender pay differences. For instance, the hourly wage rate for Vehicle mechanics (total persons) in NSW is 40 per cent higher than it is for Hairdressers. This pair of occupations has been

Table 6: Long-run Effects of Pay-Equity Measures for Hairdressers and Librarians - Macroeconomic Variables

Percentage Change Variable		*Hairdressers*		*Librarians*	
		NSW	Australia	NSW	Australia
Real GDP	-NSW	-0.0043	0.0004	-0.0014	0.0005
Employment	-NSW	-0.0057	0.0000	-0.0025	0.0000
Capital Stock	-NSW	0.0013	0.0023	0.0009	0.0015
Real Consumption	-NSW	-0.0073	-0.0012	0.0010	0.0011
Real Investment	-NSW	0.0014	0.0022	0.0012	0.0015
Balance of trade ($b)	-NSW	0.0005	0.0000	-0.0004	0.0000
Real Deficit ($b)	-NSW	0.0000	0.0000	0.0000	0.0000
Consumer price index	-NSW	0.0133	0.0047	0.0022	0.0004
Real wage	-NSW	-0.0011	-0.0018	0.0054	0.0016

NSW trade balance covers interstate and overseas trade.

Pay-equity measures for specific occupations naturally have a much smaller impact on macroeconomic aggregates than the across-the-board measures. For instance, long-run employment effect of NSW unilateral pay-equity measures for Hairdressers and Librarians would be the transfer of over 150 jobs and around 70 jobs to RoA, respectively. This and the other projected macroeconomic effects shown in Table 6 are very small in percentage change terms. This reflects the fact that both occupations combined make up only one per cent of the female wage bill in New South Wales. Pay equity measures to larger female-dominated occupations would have correspondingly larger effects.

The only industry to be noticeably affected by a Hairdressers pay-equity measure is Personal services. This industry accounts for 97 per cent of Hairdressers employment. The Hairdressers occupation makes up a third of Personal services labour costs. Personal services is projected to experience an output contraction of almost 0.6 per cent in NSW, and a quarter of a per cent nationally. All other industries are virtually unaffected by the 5 per cent pay increase to Hairdressers.[35]

Turning to the long-run occupational effects of the two occupation-specific pay-equity measures, it is found that non-trivial effects are virtually confined to the two occupations themselves. Hairdressers are projected to suffer an employment contraction of just over 2 per

---

referred to in gender-equity comparisons. However for females, for Australia as a whole, the gap in the hourly wage rate between these two occupations is only 10 per cent (NSW female earnings - for full plus part-time workers - are not available). Neither of these observations, however, gives any clear indication of the actual size of pay-equity measures which might be appropriate.

[35] Only a few industries are affected at the second decimal place, with the output of these industries changing by only about 0.01 per cent in either direction.

cent in NSW and just under 0.9 per cent Australia-wide.[36] The corresponding figures for Librarians are -0.39 per cent and -0.13 per cent.

The difference in the results for the two occupations results from the different cost and market conditions faced by the respective occupations' employers. Almost all Hairdressers work in the Personal services industries, while about sixty per cent of Librarians are employed by the Education industry, with almost a further 20 per cent employed by Public administration and Other community services. While Personal services is a non-traded goods industry (thus facing a demand curve which is not particularly elastic), it contrasts with the industries employing Librarians, which have a large public sector component. The increased wage cost of Librarians is met, according to our simulation assumptions, by governments contracting their expenditure across a number of industries (including some that don't employ many Librarians).[37] This ameliorates the effect on Librarians. However, in the case of Hairdressers the effects are concentrated in Personal services.

The other part of the explanation for the smaller percentage effect on the Librarians occupation, compared with Hairdressers, is the smaller number of employees in the former industry compared with the latter. In NSW, the total Librarians wage bill is about half what it is for Hairdressers. This limits the effect that pay increases for Librarians have on the costs of the industries which employ them.

Looking more closely at the pay-equity measure for Hairdressers, the simulation results show that the only other noticeably affected occupations besides Hairdressers itself are Other personal service workers (-0.4 per cent) and Laundry workers (-0.2 per cent). Almost 40 per cent of the former occupation, and over a quarter of the latter occupation, are employed by the Personal services industry. However, while these occupations lose from their heavy concentration in Personal services, they gain from substitution by that industry away from the more expensive Hairdressers occupation. This largely explains the much greater contraction in the occupation, NSW Hairdressers, than in the industry, NSW Personal services. Total employment in NSW Personal services falls by only three quarters of a per cent, only slightly greater than the industry's output change of -0.6 per cent (the difference resulting from capital/labour substitution).

The above results highlights one of the assumptions of the M2R model. As noted in section 3.3.2, a standard setting of 0.389 is used for all regional industries' inter-occupational substitution elasticities. However, in the case of an occupation like Hairdressers it would seem that the CES elasticity should be much lower, since it is unlikely that other occupations could be substitutes for Hairdressers in the supply of hairdressing services.[38]

This points to the summary nature of the simulations undertaken for this paper. A full examination of the effects of pay-equity measures for individual occupations clearly requires more detailed analysis of substitution parameters than there was time or resources for in the

[36] Interestingly, there is a minor projected fall of a bit under 0.045 per cent in RoA Hairdressers, due to interstate linkages between Personal Services industries. However, NSW accounts for virtually all of the 0.9 per cent contraction in Hairdressers nationally.

[37] In the case of the Commonwealth government it contracts its consumption expenditure equally across states as well. It is implicitly assumed in our simulation that NSW Librarians receive the same wage increase whether they are employed by the NSW Government, the Commonwealth Government or private firms.

[38] Whether there is any scope for substitution, say in, for instance, receptionist and cleaning activities in hairdressers' shops, is beyond the expertise of this report's author. But it is unlikely that substitution possibilities are very substantial.

present study. Ideally an examination of the effects of a pay-equity measure for Hairdressers would involve disaggregation of the Personal Services industry to allow explicit modelling of hairdressing services.

The above comments, however, do not mean that the current Hairdressers simulation is not useful. It clearly picks up that the impact of the measure will fall on the hairdressing services component of Personal services. Hairdressers make up about a third of the labour costs of Personal services, so we would have expected a contraction in the Hairdresser occupation of around that computed by the model if hairdressing services had have been separately modelled and that new industry's inter-occupational substitution elasticity were made equal to zero. In our current simulation inter-occupational substitution is taking the place of commodity substitution.[39]

4. Concluding Remarks

This paper presents an analysis of the kind of effects which may flow from certain pay-equity scenarios on the State and national economies. The analysis considers only pay-equity measures being introduced in New South Wales and in no other state.

The analysis was undertaken with the aid of a large-scale multiregional computable general equilibrium model. The key assumptions underlying the model simulations, which are outlined in sections 3.2 and 3.3, should be kept clearly in mind when considering the results presented.

The effects of the pay-equity measures instituted in NSW only, are to reduce the level of employment and output in New South Wales both in the short-run and the long-run. The long-term negative consequences, however, are significantly smaller than in the short-run.

For the nation as a whole, the aggregate effects on output and employment in the short-run are also negative. The other states' economies also contract, but by only a fraction of that which occurs in NSW. In the long-run, however, the other states economies expand, leading to an overall small increase in GDP nationally.

This result is predicated on our labour market assumption that in the long-run overall wage bargaining will ensure that the pay-equity measures leave no lasting impact on national employment. The short-run negative effects of the measures highlights the importance of overall wage restraint, in order that changes in relative real wages through pay-equity measures do not excessively raise the overall real wage level for the economy.

The preliminary nature of the present study circumscribes the conclusions which may be drawn from it. However, the paper does give some support to the following:

- there are the benefits for easing short-term adjustment problems in spacing out the introduction of pay-equity measures for individual occupations;[40]

[39] This is an important point. If the inter-occupational substitution parameter for Personal services had been given a zero value, the impact on the Hairdressers occupation would have been under-estimated. This is because the fact that the negative impact on the Personal services industry was confined only to the hairdressing activities component would have been missed. The best way to model the Hairdressers pay-equity measure would be to split hairdressing services from the Personal services industry and give the new hairdressing industry a very low inter-occupational substitution elasticity.

[40] In considering the question of adjustment problems it would seem important in the future analysis of occupation-specific wage measures to take into account the prospects for different occupations in future years.

- while pay-equity measures may not necessarily negatively affect the national economy in the long-term, the measures are likely to bring some negative short-term effects, particularly if in introducing the measures, steps are not taken to limit the increase in the *overall* level of real wages;[41]
- if NSW introduces pay-equity first and other states do not follow suit over the long-term, the State's population, during an adjustment period, will grow at a slightly lower rate than would otherwise be the case,[42] although this need not necessarily mean a lower welfare of NSW residents in a consumption per capita sense.

Follow-up work to this initial study on the effects of pay equity might usefully consider the following:

- other labour market closures, including the possibility of not all of the short-run employment loss dissipating within the 6 to 8 years we have defined as the length of the long-run solution period;
- the possibility that some of the wage-rise from pay-equity award wage increases are absorbed by producers;
- the possibility that pay-equity measures leads to increased labour efficiency;
- the possibility that the measures lead to comparative-wage-justice pay rises in other occupations in particular industries;
- the effects of other state simultaneously introducing pay-equity measures;
- different fiscal responses by the State government to pay-equity measures in occupations dominated by government employment.

Investigations could also be carried out to examine the degree of occupational-substitution possibilities in particular activities. A full study desirably should include also an extension of the M2R (NSW) labour market theory to cover the case of monopsony for certain occupations.

References

Adams, PD, and Meagher, GA, "The Outlook for Employment by Occupations", *Australian Bulletin of Labour*, 23(4), 1997, 231-254.

Australian Bureau of Statistics, *Australian Standard Classification of Occupations*, AGPS, Canberra, 1997 (ABS Catalogue No. 1220.0).

Bonnell, SM, "The Effect of Equal Pay for Females on the Composition of Employment in Australia", *Economic Record*, 63 (183), 1987, 340-351.

Crockett, GV, "Shifts in Gender Segregation in Professional Occupations in Australia - 1981 to 1991", *Australian Bulletin of Labour*, 22(4), 1996, 265-274.

For forecasts of occupational employment growth for 89 occupations in each Australian state over the period 1995-96 to 2003-04, see Adams and Meagher (1997).

[41] For instance, by slowing the pace of wage increases to male-dominated occupations.

[42] This will be accompanied by a slight increase in the growth rate of other states during the adjustment period. One can consider this adjustment period as the medium term, namely the period between the short-run equilibrium and the long-run equilibrium.

Crowe, M, "An Application of the Monash Multi-Regional Forecasting Model - The Economic Impacts of Improving the Productivity of NSW GTEs", NSW Treasury Working Paper No. 2, Sydney, 1995.

Dixon, PB, Madden, JR and Peter, MW, "The Effects of Reallocating General Revenue Assistance Among the Australian States", *Economic Record*, 69(207), 1993, 367-381.

Groenewold, N, "Does Migration Equalise Regional Unemployment Rates? Evidence from Australia", *Papers in Regional Science*, 76(1), 1997, 1-20.

Han, SH, Madden, JR and Pant, HM, "M2R (NSW): A Two-region version of the Monash Multiregional Model", CREA Research Memorandum, Centre for Regional Economic Analysis, University of Tasmania, 1998.

Madden, JR, "The Economic Impact of Certain Pay-Equity Scenarios for New South Wales", CREA Report prepared for NSW Treasury, Centre for Regional Economic Analysis, University of Tasmania, 1998.

Meagher, GA, "Forecasting Employment Opportunities in Australia: An Applied Computable General Equilibrium Approach", paper presented to 11th International Conference on Input-Output Techniques, New Delhi, November 1995.

Naqvi, F and Peter, MW, "Monash-MRF: A Multi-regional, Multi-sectoral Model of the Australian Economy", in *Modelling and Control of National and Regional Economies*, ed., LJ Vlacic, et. al, Pergamon, Oxford, 1996, 199-210.

Peter, MW, Horridge, M, Meagher, GA, Naqvi, F and Parmenter, BR, "The Theoretical Structure of MONASH-MRF", Preliminary Working Paper No. Op-85, Centre of Policy Studies and Impact Project, Monash University, 1996.