

**Full- and Part-time Work and Wages:
An Application to Two Countries**

Anne Elizabeth Hawke

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Declaration

**Apart from the assistance indicated
in the acknowledgments,
this thesis is my own original work.**

Anne Hawke

March 1993

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Abstract

This thesis investigates the extent of the wage differentials between females working full- and part-time in Australia and the United States, the causes of these differentials and the effect these differentials have on the aggregate ratio of female to male wages in both countries.

The thesis contributes to existing knowledge in three ways. Firstly, it documents the magnitude and sign of the male/female wage ratio and the full/part-time wage ratio for countries which include Australia and the United States. For both Australia and the United States, the average male wage per hour was estimated to exceed the average female wage per hour. For the United States, consistent with evidence from other international evidence, wages of full-time workers were estimated to exceed those of part-time workers. However, for Australia, part-time hourly wages were estimated to exceed full-time hourly wages by around 20 percent.

Secondly, this thesis draws upon the theories of human capital, segmented labour markets and efficiency wage to develop a model which explains individual's wages. From this model, the roles of human capital endowments, sample selection, occupations and institutions in determining the wage differential between full- and part-time workers was estimated. For Australia, differences in the endowments were not found to be an important factor in determining the causes of the wage differential between full- and part-time workers. For the United States, however, differences in the level of endowments were estimated to be important in explaining the wage differential between females working full- and part-time. Sample selection effects were estimated to be important in explaining the wage differential between females working full- and part-time in both countries. This effect

was interpreted as indicating that in Australia, higher hourly wages are inducing 'better' quality workers into the part-time labour market. Unexplained differences (such as discrimination and productivity differences) were also found to be important in explaining the wage differential between females working full- and part-time in the United States, but not in Australia. This finding lead us to examine the role of occupations and institutions in explaining the full- and part-time wage differential.

Thirdly, an estimate of the effect of part-time work and wages on the overall wage ratio between males and females was undertaken. For Australia, including part-time workers explicitly into the gender wage analysis decreased the gender wage differential estimate derived for full-time workers by 5 percentage points to 19 percent. For the United States, explicitly including part-time workers into an estimate of the gender wage differential increased the estimate from the full-time gender wage analysis by 4 percentage points to 40 percent.

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CHAPTER ONE

INTRODUCTION

1.1 Introduction

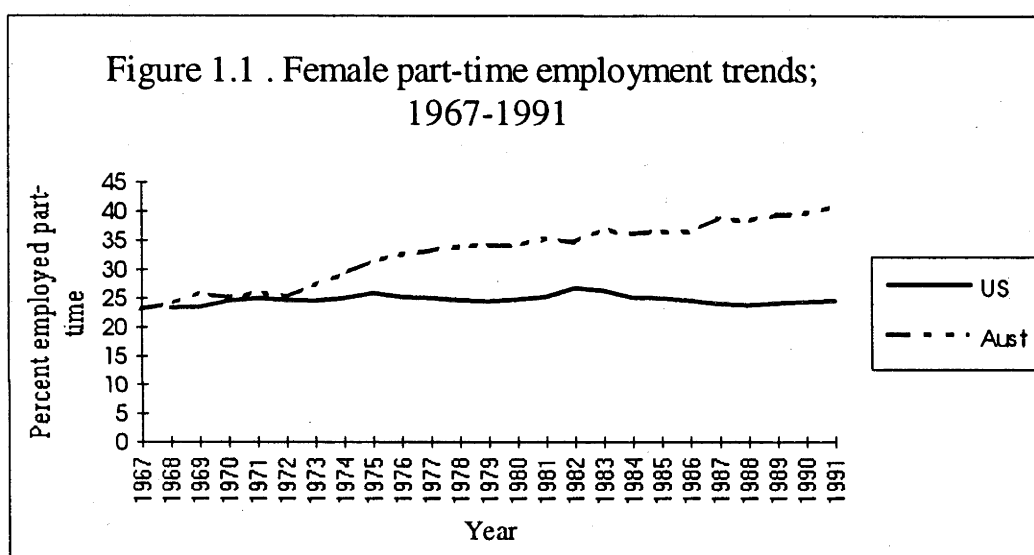
This thesis investigates the extent of the wage differentials between females working full- and part-time in Australia and the United States, the causes of these differentials and the effect these differentials have on the aggregate ratio of female to male wages in both countries. The issues involved may be identified by six stylised observations.

First, part-time work represents one of the fastest growing (and perhaps most significant) segments of the Australian labour market. Between 1966 and 1991, full-time employment of women, adjusted for the growth of the population, increased 3.7 per cent but part-time employment increased 143.0 per cent¹. Part-time jobs have increased from one job in four to two jobs in five with the trend continuing upwards. The United States experience has been quite different. Part-time employment for females has grown quickly, but not at a significantly faster rate than full-time employment. In the United States, women employed part-time represent around one in four of all employed women. Figure 1 provides a useful basis for comparison of the respective growth of part-time jobs in both countries for females between the years 1967 and 1991.² It is interesting to note that the trends of both countries began to diverge in the 1973-1975 period when equal pay for equal work of equal value was introduced in Australia. After these changes, Australian part-time employment started to increase quickly.

¹ Derived from Australian Bureau of Statistics (ABS) (various issues), Labour Force Survey, Cat. No. 6203.0

² Figure 1 is discussed in more detail in Chapter 4 of this thesis.

Second, although the majority of part-time employment in both countries is undertaken by females (see column 9, Table 1.1), male part-time employment growth in Australia, has been significantly higher than male full-time employment growth for most of the last decade (with 1988 being a unique exception, see Table 1.2). For the United States, there is no obvious trend, in some years full-time employment grows fastest, in other years, it is part-time employment which has the fastest growth. Nevertheless, for both Australia and the United States, part-time work is dominated by females.



Sources :

For the United States, U.S. Department of Labor, Bureau of Labor Statistics (1988), Labor Force Statistics Derived from the Current Population Survey, 1948-1987, August, Table B-19; and Employment and Earnings (various issues). For Australia, DX database series derived from the Australian Bureau of Statistics (various issues), Labour Force, Catalogue No. 6301.0.

a. For the United States, represents females working in non-agricultural industries aged 20 years or more. For Australia, represents females working in any industry (except defence or diplomatic appointments) aged 15 years or over. Part-time is defined as those individuals who usually work less than 35 hours per week, and who did so during the survey week. The graph represents the proportion of working females who undertaken part-time work.

Third, there exists some evidence that part-time jobs in the United States may be regarded as 'bad' or less desirable jobs compared to full time

jobs, but at this stage there is no equivalent Australian analysis. Among the distinguishing features of these less desirable jobs is that in comparison with other jobs, they have lower rates of remuneration, are less likely to have fringe benefits and may not provide for career progression. However, for both Australia and the United States, part-time work also provides flexibility in the timing and number of hours worked, additional income, and an important mechanism for individuals to continue their labour force attachment whilst pursuing other activities (such as family responsibilities and education). Table 1.3 provides evidence on the relative changes in the average hours of work per employee by sex for Australia and the United States. The hours worked per week by female part-time workers in Australia and the United States has remained relatively stable in the 1980's. However, the average number of hours worked for female part-time workers is lower by around 3 hours per week in Australia compared to the United States. For men, the average number of hours worked per week on a part-time basis has fallen through the decade in Australia, whilst for the United States the respective figure has increased. As for females, males work a higher number of hours per week in part-time work in the United States than Australia, although the difference is smaller.

Fourth, for both Australia and the United States over the last two decades there has been a relatively consistent ratio between female full- and part-time hourly wages within each country, although over time the ratio of female pay has varied relative to that of males. For Australian females in 1986, the ratio of part- to full-time hourly wages is 0.8. A comparable estimate for the United States is 1.3³.

³ An analysis of these ratios is conducted in Chapter 5.

TABLE 1.1 : Size and composition of part-time employment, 1979-90 (a)

Country	Part-time employment as a proportion of						Women's share in					
	Male Employment			Female Employment			part-time employment			part-time employment		
	1979	1983	1986	1990	1979	1983	1986	1990	1979	1983	1986	1990
Australia	5.2	6.2	6.7	8.0	35.2	36.4	37.6	40.1	78.7	78.0	78.7	78.1
Austria	1.5	1.5	n.a.	1.6 b	18.0	20.0	n.a.	20.0 b	87.8	88.4	n.a.	88.8 b
Belgium	1.0	2.0	1.9	1.7 b	16.5	19.7	21.1	25.0 b	88.9	84.0	86.1	89.6 b
Canada	5.7	7.6	7.8	8.1	23.3	26.1	25.9	24.4	72.1	71.3	71.2	71.0
Denmark	5.2	6.6	8.4	9.0 c	46.3	44.7	43.9	41.5 c	86.9	84.7	80.9	79.4 c
Finland (c)	3.2	4.5	4.9	4.4	10.6	12.5	11.5	10.2	74.7	71.7	68.7	67.8
France (e)	2.4	2.6	3.5	3.5	16.9	20.0	23.1	23.8	82.2	84.4	83.0	83.1
Germany	1.5	1.7	2.1	2.1 c	27.6	30.0	28.4	30.6 c	91.6	91.9	89.8	90.5 c
Greece	n.a.	3.7	n.a.	2.9 c	n.a.	12.1	n.a.	10.3 c	n.a.	61.2	n.a.	65.7 c
Ireland	2.1	2.7	2.4	3.8 c	13.1	15.5	15.5	17.1 c	71.2	71.6	74.3	68.2 c
Italy	3.0	2.4	3.0	3.1 b	10.6	9.4	10.1	10.9 b	61.4	64.8	61.6	64.7 b
Japan	7.5	7.3	5.5	8.0 b	27.8	29.8	22.8	31.9 b	70.1	72.9	70.0	73.0 b
Luxembourg	1.0	1.0	2.6	2.0 c	17.1	17.0	16.3	15.1 c	87.5	88.9	76.6	80.0 c
Netherlands (d)	5.5	7.2	8.7	15.8	44.0	50.1	54.2	61.7	76.4	77.3	76.1	70.4
New Zealand	4.9	5.0	6.6	8.5	29.1	31.4	31.2	35.2	77.7	79.8	79.0	76.1
Norway	7.3	7.7	10.3	8.8	50.9	63.3	51.3	48.2	83.0	83.7	79.2	81.8
Portugal	2.5	n.a.	n.a.	3.1 b	16.5	n.a.	n.a.	10.0 b	80.4	n.a.	n.a.	69.8 b
Spain	n.a.	n.a.	n.a.	1.6 b	n.a.	n.a.	n.a.	11.9 b	n.a.	n.a.	n.a.	77.2 b
Sweden	5.4	6.3	6.0	7.3	46.0	45.9	42.8	40.5	87.5	86.6	86.6	83.7
United Kingdom	1.9	3.3	4.2	5.0 b	39.0	42.4	44.9	43.8 b	92.8	89.8	88.5	87.0 b
United States	9.0	10.8	10.2	10.0	26.7	28.1	26.4	25.2	68.0	66.8	66.5	67.6

Sources : OECD Employment Outlook, July 1991, Table 2.9, p 46 and September 1987, Table 1.3, p29

a Sources and definitions available in OECD Employment Outlook 1989, Annex 1.b and

OECD Employment Outlook 1990, Annex 1.c, except the Netherlands. All estimates

represent July estimates, except 1986 which represent estimates for September.

b data are for 1989 c data are for 1988 d break in series in 1985

e the 1990 data for male employment differs from other years by including conscripts

**TABLE 1.2 : Australian and United States' Employment growth,
by sex, 1981-1989**

		1981-83	1983-85	1986	1987	1988	1989
<i>Australia</i>							
Total							
	Full-time	-1.5	2.6	3.1	0.8	3.6	3.3
	Part-time	1.9	5.0	8.5	8.2	4.1	8.7
Men							
	Full-time	-2.0	2.2	2.2	0.6	3.0	2.8
	Part-time	4.3	2.5	10.5	12.8	-3.5	15.5
Women							
	Full-time	-0.2	3.7	5.3	1.2	5.2	4.3
	Part-time	1.3	5.8	8.0	6.9	6.3	7.0
<i>United States</i>							
Total							
	Full-time	-0.6	3.7	2.2	2.7	2.4	2.2
	Part-time	3.9	0.3	2.4	2.2	1.4	1.1
Men							
	Full-time	-1.2	3.1	1.5	1.9	1.9	1.9
	Part-time	5.8	-0.9	3.0	2.5	1.5	-0.4
Women							
	Full-time	0.5	4.6	3.4	3.8	3.2	2.8
	Part-time	3.0	0.9	2.2	2.0	1.3	1.8

Source : OECD Employment Outlook, July 1990, Table 1.5, p23-24

Fifth, although the ratio of female part- to full-time hourly wages have been constant over time, female wages relative to males has changed significantly over this period in Australia. The returns Australian females receive for part-time work is approximately 0.9 of the full-time male wage. For the United States, the comparable statistic is 0.6. This difference is very marked. For Australia, in 1989 the ratio of female to male wages is approximately 0.8. For the United States, for the same year the ratio is approximately 0.6⁴.

Sixth, in the Australian industrial relations system and the United States legislative system mechanisms have been implemented to ensure that there is no difference in the rates of pay between groups doing identical jobs. Thus, where differences in the average wage between males and females do occur, this difference may reflect either non-compliance with the industrial law or differences in the representation of groups into occupations and industries.

For both countries, female part-time representation by industry and occupation is generally more concentrated than full-time workers, with the service sector being a significant employer of part-time workers in both countries. More interesting, however, is the other types of part-time work undertaken in both countries. Compared to their United States counterparts females working part-time in Australia are more strongly represented in the semi-professional and professional groups⁵.

⁴ Derived from Table 31, Current Population Reports, Consumer Income, Series P-60, Number 172, for all males and females mean incomes.

⁵ A more comprehensive description of the occupational and industrial segregation of part-time workers in both countries is provided in Chapter 6. This stylised 'fact' is noted by Owen (1978) who states that "on average, part-time workers earn less than full-time workers, but this gap generally arises less because employers pay part-timers a lower rate for the same work (although sometimes this does occur) than because part-timers are relegated to lower paid sectors", p12.

TABLE 1.3: Actual hours worked per employee, by full-and part-time employment and sex, 1980-88

	<i>Australia</i>			<i>United States</i>		
	1980	1983	1988	1979	1983	1988
All employed						
Total	38.4	37.8	38.0	38.9	38.3	39.4
Full-time	42.7	42.4	43.5	43.1	43.0	43.8
Part-time	16.4	16.4	16.4	19.0	19.1	19.8
Men						
Total	42.3	41.7	42.8	42.0	41.2	42.4
Full-time	43.7	43.3	44.8	44.6	44.4	45.3
Part-time	17.3	17.5	16.0	18.6	18.6	19.4
Women						
Total	31.5	31.3	30.9	34.5	34.5	35.7
Full-time	40.0	40.1	40.4	40.3	40.6	41.4
Part-time	16.2	16.1	16.5	19.2	19.4	19.9

Source : OECD Employment Outlook, July 1990, Table 1.6, p26-27

This thesis analyses the determinants of all these stylised observations, but focuses upon four particular issues. Firstly, why is it that Australian females working part-time are paid around 20 per cent more per hour than their full-time counterparts, and females working part-time in the United States are paid over 20 per cent less per hour than females working full-time? The magnitude of these numbers are not trivial. For example, for a typical Australian female working part-time in 1992, if her pay ratio is equal to the United States, she would earn \$47.72⁶ per week less - that is 20 per cent. Furthermore, because United States females are badly paid relative to females in Australia, she will be paid a further \$256.15⁷ per

⁶ Based upon the average weekly total earnings of Adult females, from ABS (1992), Distribution and Composition of Employee Earnings and Hours, Australia, May, Catalogue No. 6306.0, Table 22.

⁷ Based upon the ratio of male to female wages in the United States in 1989 of 0.56 of the mean earnings of males in Australia, using ABS (1992), Distribution and Composition of Employee Earnings and Hours, Australia, May, Catalogue No. 6306.0, Table 1.

week less relative to the average Australian male wage of \$581.90. It might be expected that differences of this magnitude will affect a whole range of social and economic responses including family income distribution, time devoted to raising children, marital status and poverty. For example, if the relative wage between full- and part-time work is higher in Australian than the United States, we may expect to observe a higher proportion of females working part-time.

Secondly, from the observed relative returns to working full- or part-time in both countries, the role of human capital and other factors including institutional differences in explaining these differences is estimated. The human capital model explains earnings in terms of differences in endowments such as experience, educational qualifications and marital status. Thus, where a wage differential between females working full- and part-time remains after controlling for observable factors, this component is often interpreted as providing some indication of the impact institutional factors exert upon the determination of wages⁸. It has been conjectured that most of the Australian differential may be explained by institutional factors. Understanding the role of institutions is very important in the current Australian policy debate as both major political parties and trade unions are planning to institute changes to our institutional wage setting practices.

Thirdly, utilising these results, an analysis of the role of occupational and industrial distributions in explaining relative wages both within and between countries is undertaken. Table 1.4 indicates the differences in the relative wages between full- and part-time workers in

⁸ Factors such as mismeasurement of observations and omitted variables will impact on this residual component. The implications of these factors are discussed in Chapter 2.

different occupational categories for both Australia and the United States⁹. It is clear from this table that the occupational distribution of workers, will have important implications for the average wages of full- and part-time workers.

TABLE 1.4 : Female wage ratios *, by occupation, 1986/87

<u>Occupation</u>	<u>Australia</u>	<u>United States</u>
managers and administrators	1.5	0.79
professional	1.22	0.91
para-professionals	1.34	0.85
trades persons	1.57	1.02
clerks	1.35	0.81
sales and personal service workers	1.42	1.04
plant and machine operators	2.05	0.86
labourers and related workers	1.30	0.81
TOTAL	1.31	0.84

* ratio is $(\ln W_{pt} / \ln W_{ft})$

Fourthly, the wages of females working full- and part-time are compared to males in order to determine the effect part-time wages have on the wage differences between males and females, and the roles of human capital, sample selection and discrimination in explaining this difference. The United States experience on relativities between full- and part-time workers appear to be more typical of most OECD countries than Australia. Table 1.5 provides some evidence on OECD comparison of the hourly

⁹ The raw occupational data for the United States has been respecified in order to maintain consistency with the International Labour Organisation's ISCO-88 classifications, upon which the Australian data is based.

remuneration of part-time workers relative to full-time workers for both men and women.

It is noteworthy that only in Australia and the Netherlands do females working part-time have higher earnings (on average) than those working full-time. Additionally, Australia is the only country for which the part-time earnings per hour for men exceed full-time earnings.

Table 1.5 : Ratio of part- to full-time hourly earnings*

<i>Country</i>	<i>Year</i>	<i>Men</i>	<i>Women</i>
Belgium	1972	85.0	99.7
France	1972	91.8	92.8
Germany	1972	81.8	95.2
Italy	1972	93.9	96.5
Japan	1977	n.a.	81.4
Luxembourg	1972	80.1	80.5
Netherlands	1972	83.5	119.0
United Kingdom	1981	n.a.	91.9

Kingdom

* manual workers

n.a. represents not available

Source :

OECD (1983) Employment Outlook September

The main advantage of undertaking this analysis within a two-country framework has been discussed in the full-time context by Gregory *et. al.* (1985, 1986). Then as now, the analysis of full- and part-time wage differentials is enhanced in a two country analysis by providing a natural experiment on the effect of equal pay and comparable worth in Australia, treating the United States as a control.

1.2 Structure of thesis

Following this introduction there are seven chapters. Chapter 2 analyses the competing theories which attempt to explain wages and participation of particular types of workers. Three broad theory groups are discussed : the human capital theory, efficiency wage theory and segmented labour markets theories. Chapter 3 provides a background of the institutional framework and aggregate time series and cross-sectional data of Australia and the United States. Since the primary focus of this thesis is cross-sectional evidence, this chapter attempts to place this evidence within a historical context.

Chapter 4 analyses the employment decisions individual's make in the context of a general model of utility. The results of this chapter are utilised in the following chapter to correct non-random sample selection in the wage equations of full- and part-time workers. Chapter 5 estimates the wage differential between full- and part-time Australian and American females and evaluates the respective roles of productivity, endowments, sample selection and discrimination in explaining this differential. Chapter 6 analyses the role of occupation and industry structure on the determination of wages for part-time workers. In this chapter, simulations are undertaken to predict the likely effects on the wages of females in both countries of a non-discriminatory (in terms of sex discrimination and discrimination on the basis of the number of hours worked) occupational distribution. Chapter 7 analyses the role the wage differential, between full- and part-time workers, has upon the gender wage differential for both countries. Chapter 8 draws together the findings of the thesis in an attempt to provide some implications of policy settings in each country on work and wage outcomes.

CHAPTER TWO

EVIDENCE AND EXPLANATIONS OF FULL- AND PART-TIME WORK AND WAGES

2.1 Introduction

The purpose of this chapter is to identify some of the international evidence on wage differentials between workers on full- and part-time schedules, and place these findings in the context of competing theories which have traditionally been used to explain average earnings of individuals. The three theories discussed are the human capital, segmented labour market, and efficiency wage theories. An overview of existing explanations relating to occupational segregation and wages is also provided. Although these theories are identified separately, they share many similarities.

2.2 Empirical Findings

In Australia and the United States wage differentials between males and females who work full-time are well documented¹. However, most analysis ignores what is an increasingly important component of the labour force - part-time work. This thesis goes some way towards offsetting this limitation and extends the existing literature to include an analysis of wage differentials between full- and part-time workers, and then estimate the overall differential between males and females, after accounting for part-time work.

For Australia, in 1986 approximately 79 per cent of part-time workers were female. Approximately 40 per cent of females who worked did so on part-time schedules. For the United States in the same year,

¹ For Australia see Gregory et. al.(1986), Chapman, B.J., Mulvey, C.,(1986) and for an international comparison see Gunderson, M.,(1989) for a summary.

approximately 67 per cent of part-time workers were female. Approximately 27 per cent of females who worked were part-time workers².

These estimates clearly identify that to understand the role part-time work has in the labour market, it is necessary to come to terms with female participation in part-time work. This thesis attempts to contribute to the existing evidence on part-time work in three ways. Firstly, it establishes the sign and order of magnitude of the wage differential between females working full- and part-time work in Australia and the United States. Secondly, to explain why the wage differential differs between the United States and Australia. Thirdly, to determine the impact of part-time participation on the average wages males and females receive.

Table 2.1 details the evidence from Australian studies on the extent of the gender wage differential.

Table 2.1 : Recent Australian estimates of the gender wage differential

Author	Year Analysed	Dependent Variable	Gender Wage Gap
Gregory, R.G., Daly, A.E. & Ho, V (1986)	1986	weekly gross earnings	20.70%
Chapman, B.J., & Mulvey, C., (1986)	1982	hourly wage rates	15.40%
Gregory, R.G., & Ho, V., (1985)	1981	weekly gross earnings	23.30%
Chapman, B.J., & Miller, P.W., (1983)	1976	hourly wage rates	21.70%

It is clear that despite the enactment of equal pay legislation in Australia beginning two decades ago, females are paid on average 15 to 20 per cent

²

OECD (1987), *Employment Outlook*, September, Table 1.3, p29

less than males. However it is necessary to recall a study of the gender wage differential by Haig (1982) who utilised data collected before the 1972 Equal pay decision, and found evidence to support the existence of a gender wage differential of 46 per cent. This provides some evidence to support the hypothesis that the gender wage differential has narrowed as a result of Australia's institutional framework. Indeed, Gregory *et.al.* in their analyses (which are all conducted after the full implementation of the equal pay legislation for Australia) often assume that Australia's pay structure provides a non-discriminatory control against which international evidence may be related.

From Table 2.2 it is clear that whilst Australia has made approximately a 30 percent reduction in the level of inequality between the wages of males and females between 1960 and 1980, the United States ratio has remained constant. For most other countries, some reduction in the level of inequality between male and female wages would appear to have been made. During the 1980's, the gender wage differential began to narrow in the United States, but to date the change is not as great as that observed in Australia.

Table 2.2 : International Estimates of the full-time gender wage differential *

Country	1960	1980
Australia	0.59	0.75
Britain	0.61	0.79
Canada	0.59	0.64
France	0.64	0.71
Germany	0.65	0.72
Italy	0.73	0.83
Japan	0.46	0.54
Sweden	0.72	0.90
United States	0.66	0.66
USSR	0.70	0.70

* Ratio female/male earnings

Source : Gunderson, M.,(1989),p47

Although the existing literature has provided a valuable contribution to the debate on the underlying influences upon the gender wage differential, there exists two deficiencies in the approaches used.

Firstly, most studies exclude part-time workers from the analysis. Since around 40 per cent of Australian females and around 10 per cent of men are working on part-time schedules, it is important to understand the effect of explicitly including these groups from the gender wage differential.

Secondly, as a result of the exclusion of part-time work from models to estimate the gender wage differential, the role of non-random sample selection effects in a three way choice between working full- and part-time and not working, has to be conducted. This thesis contributes to the existing literature on the gender wage differential by quantifying the role these two factors have upon the overall estimate of the gender wage differential.

2.3 The wage differential between full- and part-time workers

Although no studies exist for Australia, there are several studies for the United States which analyse the wage differential between full- and part-time workers. Owen (1978) estimated that full-time employed males earned approximately 30 per cent more than males employed part-time, and the comparative estimate for females was 17 per cent. Long and Jones (1981) focussed on married women and found an 11 per cent wage differential which favoured full-time workers.

Lundberg (1985) recognising the inter-relationship between hours and wages estimated that the offered wage would rise with the number of hours worked to compensate to the increasing disutility of additional hours.

Table 2.3 : Estimates of the full- and part-time wage differential

Author and Country	Year of Analysis	Sample group	Wage differential between full- and part-time workers
Main, B.G.M.,(1988) United Kingdom	1980	Females	15.5% ³
Ermisch, J.F., Wright, R.E.,(1988) United Kingdom	1980	Females	16.5% ⁴
Owen, J.D.,(1978) United States	1973	Females Males	28.0% ⁵ 51.0%
Long,J.E.,Jones,E.B., (1981) United States	1972	Married Females	11.0% ⁶
Hotchkiss, J.L.,(1991) United States	1984	Females Males	17.0% ⁷ 26.0%
Blank, R.M., (1990) United States	1987	Females Males	8.3% ⁸ * 6.5% *
Ehrenberg,R.G., Rosenberg,P., Li,J.,(1988) United States	1984	All workers	18.0% **
Simpson, W.,(1986) Canada	1981	All workers (hours > 0)	30.8% ⁹

* derived from the data tables presented in paper

** represents the predicted mean differential after human capital adjustment

Owen (1978) argues that employees who work less hours are less likely to receive training and hence do not progress in their jobs or wages. Table

³ Main, B.G.M., (1988), p340

⁴ Ermisch, J.F., Wright, R.E.,(1988),Table 4

⁵ Owen, J.D.,(1978), p13

⁶ Long, J.E., Jones, E.B.,(1981), p421

⁷ Hotchkiss, J.L.,(1991) p912

⁸ Blank, R.M.,(1991), p129;Calculation was $(8.70-8.03)/8.03$ and $(13.26-12.43)/12.43$

⁹ Simpson, W.,(1986) ,p 800

2.3 provides details of the extent of the full- and part-time wage differential for the United States, Canada and the United Kingdom¹⁰.

Estimates of the wage differential between full- and part-time workers differs significantly between countries. On average the magnitude of the full- and part-time differential is higher than the gender wage differential. Additionally, in each of these countries part-time wages are lower per hour than full-time rates. Australia, therefore, is an unusual case. In Australia, part-time workers receive more per hour than full-time workers.

The empirical findings on the gender wage differential and the full- and part-time differential have provided an interesting basis for comparison. In subsequent chapter an attempt shall be made to estimate the full- and part-time differential for Australia and the United States as well as the gender wage differential after explicitly accounting for part-time work, for both countries.

So far, two question have been focussed upon - why do males earn more than females ? and why do full-time workers earn more than part-time workers in the United States but not in Australia ?

2.4 Why do wages differ between individuals ? ¹¹

Many factors have been suggested to explain why wages differ between individuals. They include ability, motivation, family background, chance, educational qualifications, experience, age and the type of job. Perhaps the first attempt to reconcile wage differences between individuals was Adam Smith in his Wealth of Nations. He stated

¹⁰ Australia is not represented in this table, as, to date, there does not exist any analysis specifically targeted at explaining the full- and part-time wage differential.

¹¹ See Treiman, D.J., Hartmann, H.I.,(1981)

[t]he five following are the principal circumstances which, so far as I have been able to observe, make up for a small pecuniary gain in some employments, and counter-balance a great one in others: first, the agreeableness or disagreeableness of the employment themselves; secondly, the easiness or cheapness, or the difficulty and expense of learning them; thirdly, the constancy or inconstancy of employment in them; fourthly, the small or great trust which may repose in those who exercise them; and, fifthly, the probability or improbability of success in them ¹²

This thesis does not propose to examine the wages of individuals which may be explained on the basis of differences in their risk behaviour such as individuals who accept low paying jobs in the hope of becoming a superstar¹³. Instead, an analysis of why wages differ between individuals when their wages are not subject to significant volatility as a result of extreme risk profiles is undertaken. Three theories are discussed in the context of explaining individual's wages - human capital, segmented markets and efficiency wages.

2.4.1 The human capital model

The human capital model forms the basis for several explanations of individuals earnings. This theory assumes that individuals invest in human capital (which includes education, training, health care and migration) in the expectation of participating in both labour and non-labour market activities. The type and quantity of the investment determines an individual's wage (including reservation wage for non-workers). The individual is assumed to maximise lifetime earnings given the costs and benefits associated with the investment in human capital.

¹² Smith, A.,(1776), p116-117.

¹³ See Rosen, S.,(1981)

The model is derived from papers of Ben-Porath (1967), Mincer (1974) and Becker (1975). Following Mincer and Polachek (1974), the human capital earnings function may be stated as

$$(1) \quad E_t = E_{t-1} + r C_{t-1}$$

where E_t is the gross earnings in period t , C_{t-1} is the dollar amount of investment in period $t-1$ and r is the average rate of return to an individual's human capital.

Rewriting (1)

$$(2) \quad E_t = E_{t-1} + E_{t-1} r \frac{C_{t-1}}{E_{t-1}}$$

Re-writing (2)

$$(3) \quad \begin{aligned} E_t &= E_{t-1} + E_{t-1} r k_{t-1} \\ &= E_{t-1} (1 + r k_{t-1}) \end{aligned}$$

where k_{t-1} is the ratio of investment expenditure to gross earnings in period $t-1$. Following a simple expansion of (3), and assuming that r is a constant¹⁴, and noting $E_t = E_0(1+rk_0)(1+rk_1)\dots(1+rk_{t-1})$, may be approximated by the logarithmic statement $\ln(1+rk) \approx rk$, then

$$(4) \quad E_t = E_0 + r \sum_{i=0}^{t-1} k_i$$

School and post school experience may be separated as follows

$$(5) \quad E_t = E_0 + r \sum_{i=0}^{s-1} k_i + r \sum_{i=s}^{t-1} k_j$$

where k_i and k_j are investment ratios during and after school respectively. Imposing the assumption that the investment ratio in school equals one, the earnings function becomes

$$(6) \quad E_t = E_0 + rs + r \sum_{j=s}^{t-1} k_j$$

¹⁴

This specification is identical to that discussed in Chapman and Harding(1980),p363.

We may now estimate this equation as

$$(7) \quad W_i = X_i\beta + \varepsilon$$

where W_i is the hourly wage rate for individual i , and X represents a vector of endowments which include educational attainment (which may be either years of schooling or, as is done in this paper, dummy variables for each classification allowing for different returns to each level of education), experience is labour force experience (using the Mincer approximation of age in years - age left school)¹⁵, as well as occupational, demographic and other human capital terms. As returns to experience are not thought to be constant over an individual's lifetime, a quadratic experience term is also included in the specification of the earnings function.

Productivity improving investment in human capital may take two forms- formal education and on-the-job training. In the case of formal schooling, individuals pay the direct costs of tuition and forego current earnings in order to raise their future productivity which in turn leads to higher wages than they would be otherwise able to achieve. For on-the-job training ¹⁶ Becker (1975) identified two types of training - general and specific. He argued

[g]eneral training is useful in many firms besides those providing it..[and]..[e]mployees pay for general on-the-job training by receiving wages below what they would receive elsewhere ¹⁷

Contrasted to this is

¹⁵ A discussion of this specification of the experience term is conducted in Chapter 5. Additional regressions which attempt to demonstrate the sensitivity of other regressors to the specification of the experience term is undertaken in Appendices F and G.

¹⁶ Arrow (1962) proposed that " technical change in general may be ascribed to experience, that is the very activity of production which gives rise to problems for which favourable responses are selected over time". That is, Arrow argues increases in total labour productivity may arise from factors other than physical capital investment changes.

¹⁷ Becker, G.S.,(1975),p21

[c]ompletely specific training [which] can be defined as training that has no effect on the productivity of trainees that would be useful to other firms¹⁸

For specific training, the costs and benefits are shared between the employer and employee.

The shares of each depend on the relations between quit rates and wages, layoff rates and profits, and on other factors....such as the cost of funds, attitudes toward risk and desires for liquidity¹⁹

Training may not be completely specific nor completely general. Becker argued that both type of training have a similar effect on productivity.

The predictions of the model with respect to the investment in human capital for full- and part-time employment suggest that individuals who intend to work in part-time work rather than full-time work will invest in lower levels of human capital if the rate of return to effort are the same for both groups. This results from an individual evaluating the lifetime returns to human capital investment. Since costs, unlike benefits, of education are not dependent upon the intensity of labour force participation²⁰, the number of years of workforce experience required for an individual to break-even regarding their investment in human capital is longer for individuals working part-time rather than full-time. Thus, in cost-benefit terms, part-time workers would be expected to undertake lower level of education than full-time workers²¹.

Also, individuals who treat part-time work as a short-term proposition before or after undertaking full-time work (such as the young, old and those with young dependants) will be more closely related to full-time workers than those not in the labour force with respect to their human

¹⁸ Becker, G.S.,(1975),p26

¹⁹ Becker, G.S.,(1975),p30. An extension of this single period model to a two period model is analysed in Hashimoto (1981).

²⁰ For a discussion of recent changes to student fees in Australian higher education see Chapman, B.J., Chia, T.T.,(1992)

²¹ This argument ignores the non-economic externalities of investment in human capital.

capital endowments. Part-time work may also be viewed as a means to lower the rate of human capital depreciation which would be observed if the individual withdrew completely from employment.

In summary, the simple predictions from the human capital model with respect to part-time workers may be summarised into three. Firstly, part-time workers are predicted to have less education than full-time workers since their expected labour force commitment is lower. Additionally, the education part-time workers obtain will depreciate a higher rates than full-time workers due to reduced workforce exposure. Secondly, since part-time workers has a smaller hours schedule than full-time workers, employers are less likely to provide training for part-time workers, and hence their productivity is predicted to be lower than that observed for full-time workers. Thirdly, by its very nature, part-time workers will obtain less workforce experience than full-time workers.

2.4.2 Criticisms of the human capital model

The most significant criticism of the human capital theory has developed from sociological studies. Fischer (1987) criticises human capital theory on the basis that the institutional forces and existing economic incentives that affect and limit the range of occupations open to women ²² are not explained by the theory. Indeed, it is argued that human capital theory merely rationalises the existing gender wage and participation structure rather than providing an explanation. Supporting this conclusion Daymont and Andrisani (1984) state that

..after many empirical attempts spanning more than a decade, researchers are still unable to account for more than about half of the male-female differences in earnings through differences in productivity related variables ²³

²² England (1982)

²³ Daymont, T.N, Andrisavi, P.J., (1984), p409

The implicit assumption of the human capital theory of free occupational choice is questioned on the grounds that sexual stereotyping limits female choices prior to labour market entry. Rather than concentrating on ex post labour market performance, it is argued that *ex ante* conditions should be examined and explained²⁴. It is argued that social conditioning of women for the labour market is different than that for males and that this effects occupational outcomes.

The social conditioning is said to encourage females into nurturing roles and household related work without the "male" traits of aggressiveness, physical activity, and mathematical aptitude. As a result of these conditioned roles, when females do enter the workforce they are encouraged into occupations such as social work, teaching, nursing and clerical work. Conversely jobs which require the traits which social conditioning portrays as "male" as a result of their quantitative nature, supervisory positions, physical activity and time-consuming high energy demands such as engineer, gardener, executive or mechanic are under represented by females and dominated by males²⁵.

England (1984) argues that the allocation of domestic roles to women itself perpetuates social stereotyping and male self-interest creates impediments to prestigious male occupations²⁶ whilst allowing an easier transition for women into occupations which are complementary to their socially conditioned traits. Stephan and Levin (1983) studied USA PhD graduates and found that fields of study are consistent with socially conditioned traits. Other authors²⁷ have viewed occupational choice a result of "anticipatory socialisation" whereby future choice is somewhat

²⁴ See Corcoran and Courant (1985) (1987), Killingsworth (1985); England (1982) (1984); England and McCready (1986).

²⁵ Chadorow (1978) and Monk-Turner(1984).

²⁶ See Daniel, A.,(1983), Quine, S.,(1986) , Jones, F. L. (1989) for the determination of prestigious occupations for Australia.

²⁷ Feldman (1976)

predetermined by societies role in the formative development of an individual's tastes which include perceived opportunities and costs of working. As society determines different roles for males and females, so the tastes which impact on work decisions also differ for males and females. Lehrer and Stokes (1985) empirically analyse the role of stereotyping on occupational outcomes. Their study failed to find evidence of stereotyping affecting occupational outcomes.

Additional criticisms of work undertaken which utilises the human capital approach fall into four broad categories. Firstly, the wage may not reflect the entire reward for the job. That is, factors such as prestige and fringe benefits will not be included in the wage for that job. This of course is not a criticism of the theory but of the available data and analysis which fails to account for these effects.

Secondly, although the productivity differences are assumed to be measurable, and perhaps are measurable for jobs involving the production of physical goods, differences in productivity for most other jobs are virtually impossible to measure. Thus, although researchers²⁸ have attempted to estimate the productivity of an individual using differences in their stock of human capital (which may be represented by education, training, work experience and health), no evidence exists on the degree to which these factors proxy the true productivity level of an individual.

Thirdly, some researchers argue that factors other than worker productivity affect wages such as union strength and the international competitiveness of an industry or firm²⁹. The human capital model does not include such factors as explanators of wages, and hence any effect from such factors will be residuals to any decomposition, and hence incorrectly attributed to discrimination.

²⁸ Schultz (1961); Mincer (1970); Becker (1975)

²⁹ Piore (1979); Phelps-Brown (1977)

Fourthly, factors such as experience, are themselves often proxied by Mincer's formulation (age-years of schooling-6)³⁰, and even if this number were an accurate representation of experience, any effect experience may have in the determination of wages may simply reflect seniority³¹. A related issue is whether years of schooling is an appropriate indicator since it does not account for variations in quality. For example, one would expect a degree holder with a distinction average to have a greater earnings capacity than another student with that same degree who has a pass average. Again, this point represents a criticism of the empirical application of the theory rather than the theory itself.

Specific criticisms which relate to part-time work may be summarised into three points. Firstly, the human capital model does not account for the differences in the hours of work between full- and part-time workers. Thus, the motivation and skill required for the first hour of work is assumed to be equal to the thirtieth hour. Secondly, whilst the experience proxy (age-years of schooling-6) may not be a good measure of actual experience for full-time workers, it is likely to be less accurate in its estimation of a part-time worker's experience³² as a result of them spending less time on-the-job. Thirdly, as is discussed in the following chapter, trade unions do not target part-time workers as potential members. Thus, the benefits associated with unionisation which accrue to full-time workers, will be less likely to flow through to part-time workers.

³⁰ A recent Australian study by Lambert, S.,(1991) tests the results from different proxies for experience and finds in a comparison of actual experience in a wage equation (as is the case for this analysis), Mincer's proxy produces different, although similar results. The effects of different measures of experience in the estimation of human capital earnings functions of full- and part-time workers is undertaken in appendices E and F.

³¹ Edwards (1977) argues experience should be interpreted as a proxy for seniority rather than experience. Daly (1990) analyses the relationship between experience and wages over the life-cycle for Australia, the United States and Britain.

³² Appendices E and F include alternative specifications for experience and experience squared in both full- and part-time work.

2.4.3 Segmented labour market theory

According to this theory, institutional factors such as wage arbitration, unions and non-competitive product markets divide the labour market into two - a primary and secondary market. In the primary labour market, conditions are good for both employees and employers. For example wages are relatively high and relatively high amounts of training occur. In this market, there exists a set of labour markets internal to each firm where specific rules and institutions (for example seniority) govern the allocation and cost of labour. This market retains its advantages by limiting entry of individuals.

The secondary labour market may be stereotyped as offering poorly paid jobs, relatively poor conditions and few opportunities for training. Taubman and Wachter (1986) have argued that if training does exist in this market, it may actually "scar" individuals future earnings.³³

Secondary labour market theories pervade many other theories of labour markets. Bulow and Summers (1986) develop a dual labour market based upon the idea of efficiency wages whereby workers in the primary labour market are paid above their alternative wage while workers in the secondary market are paid a competitive wage. Akerlof (1982) characterises the primary labour market as that part of the economy where the 'gift' of hard work by workers is reciprocated by the 'gift' of higher wages. In Akerlof's secondary labour market, 'gifts' are not exchanged and competitive wages apply.

The demarcation between primary and secondary labour markets beyond the generalities presented here have been difficult to ascertain.

³³ Taubman and Wachter, (1986), p 1185. It is also suggested that training in this market may be considered as negative general training.

Taubman and Wachter (1986) suggest research in the United States aimed at finding this demarcation has been relatively unsuccessful³⁴.

In their paper on dual labour markets, Dickens and Lang (1985)³⁵ identify that dual labour markets consist of a

distinct low wage (secondary) labor market in which there are no returns to schooling and workers do not receive on-the-job training, and that there are non economic barriers that prevent at least some secondary workers from obtaining better (primary) jobs..... Dual market theorists have maintained that jobs can be roughly divided into two groups : those with low wages, bad working conditions, unstable employment, and little opportunity for advancement (secondary jobs), and those with relatively high wages, good working conditions and opportunities for advancement into higher paying jobs (primary jobs). Advocates of this view have argued that primary sector jobs are rationed, and that, in particular, women, blacks, and other minorities find it difficult to obtain primary employment.³⁶

Most studies which have attempted to analyse the degree to which a labour market may be characterised by some form of duality, compare the job/worker characteristics³⁷ or compare the wages of occupations and industries³⁸.

Doeringer and Piore (1971) argue that as a result of technology which requires specific skills, and hence significant on-the-job training, employers attempt to minimise turn-over by creating structures within the firm which reward length of service - such as pay increments based upon seniority and promotion up a well-defined job-ladder. Although the supply and demand of the labour and product market affect employers decisions, one primary aim is to minimise training and hiring costs through a reduction in labour turnover. Thurow (1975) suggests higher wages are

³⁴ Sloane (1985) also supports this conclusion.

³⁵ Dickens, W.T., Lang, K.,(1985)

³⁶ Dickens, W.T., Lang, K.,(1985), p792

³⁷ Gordon, D. (1971)

³⁸ Osterman, P.,(1975) for supporting evidence of the dual labour market theory .

needed to 'bribe' more experienced workers to pass on their skills to new entrants. Gordon (1972) and Stone (1975) argue there exist many different job ladders, each with several rungs which may divide workers through factors such as sex, race, disabilities, ethnicity and age thereby minimise the bargaining power of workers. Edwards (1979) argued that management creates internal job markets to provide incentives for workers to perform well in their job. Kahn (1976) uses case study evidence on a firm in which the union was able to transform the workplace into one which allowed employees to receive added benefits through seniority increments and employment stability.

In each of the internal labour market explanations, as the level up the job ladder increases, so does the effect on wages of the internal arrangements. Through a reduction in the supply of labour external to the firm, existing workers are able to achieve the benefits such as wage ladders, which increase the wage to above the competitive minimum.

Primary and secondary labour markets relate directly to full- and part-time work, respectively, when we consider that full-time work generally attracts higher wages³⁹, higher levels of training, higher degrees of unionisation, permanency in employment and access to benefits such as superannuation and fringe benefits relative to part-time work⁴⁰.

2.4.4 Efficiency Wage Models

Human capital predicts that individuals are paid on the basis of their investment in factors such as skills, education, and age. These human capital endowments attract higher remuneration as a result of workers with

³⁹ Except of course, for Australia where full-time wages per hour are lower than part-time wages per hour.

⁴⁰ Differences in employment stability, fringe benefits, unionisation are discussed in Chapter 3.

these attributes being seen as having higher levels of productivity. An alternative hypothesis to the relationship between productivity and earnings is collectively known as efficiency wage models. Efficiency wage theory suggests that rather than human capital leading to increases in productivity it is earnings which exhibit a direct causal link with productivity.

The foundations for efficiency wage theory can be traced back to Adam Smith who, noting the existence of efficiency wages for goldsmiths, stated that

The wage for goldsmiths and jewellers are every-where superior to those of many other workmen, not only of equal, but of much superior ingenuity; on account of the precious materials with which they are entrusted ⁴¹

Efficiency wage theories were also used in development economics literature where higher wages were justified on the basis that higher levels of nutrition increase the productivity of the workforce.

More recent contributions to efficiency wage theories ⁴² have been used to explain differences in inter-industry wage levels. Three explanations of efficiency wages are commonly offered as :

In one case, firms pay higher wages than the workers' reservation wage so that employees have an incentive not to shirk. In a second version, wages greater than market-clearing are offered so that workers have an incentive not to quit and turnover is reduced. In a third version, wages greater than market-clearing are paid to induce loyalty to the firm.⁴³

Differences in inter- and intra-industry wages, and similarly for occupations, are addressed by efficiency wage theory.

If all firms were identical, one would not expect to see different firms paying different wages even if efficiency wage considerations were important. But when there are differences in their ability to

⁴¹ Smith, A.,(1776), p122

⁴² Krueger and Summers (1988), Katz (1986), Dickens and Katz (1987), Stiglitz (1986) and Akerlof and Yellen (1985)

⁴³ Akerlof and Yellen (1985), p829

bear the costs of turnover, to supervise and monitor their workers, or to measure labor quality, either because of differences in management capacity, or because of differences in the technology of production then the optimal wage to pay will vary. Thus efficiency wage models unlike standard competitive formulations can explain why characteristics of firms that do not directly affect workers' utility can affect wage rates.⁴⁴

From this quotation it is clear that unlike the human capital model, efficiency wage theory emphasises firm differences (unobserved and observed) in the explanation of wage differentials rather than individuals endowment differences (observed and unobserved).

In summary, efficiency wages differ from traditional human capital, neo-classical earnings differential explanations by emphasising the demand side factors which affect wages. The contribution of efficiency wages to understanding wage differentials beyond the human capital endowment-productivity effect provides justification for observed industry and occupational wage differences in that the more educated tend to be in occupations/industries where monitoring costs or labour turnover is highest. The wages of individuals with lower human capital endowments may be set by employers at a competitive rate whilst the more highly skilled worker may receive an efficiency wage premium thereby leading to the occupational/industrial wage differential even allowing for differences in skills. As occupational/industrial structure is seen as an important consideration in the understanding of full- and part-time wage differentials this explanation is incorporated into the overall findings.

Efficiency wage theory has direct implications for full- and part-time work. Firstly, if part-time workers are regarded as 'bad' workers in terms of motivation and skill, then it is predicted that the wages part-time workers receive would be lower than full-time workers. Secondly, since the training costs of part-time workers are at least equal to full-time

⁴⁴ Krueger and Summers (1985), p261

workers, firms are likely to attempt to recoup any difference by lowering the wage of part-time workers relative to those working full-time. Thirdly, since part-time workers have non-standard hours the costs of monitoring would be higher than for full-time workers. Finally, as discussed in Chapter 3, some jobs by their very nature (such as having a peak periods of demand) lend themselves more readily to part-time work. Other jobs have a constant, stable demand for attendance (such as supervisory/managerial jobs) and thus lend themselves more readily to full-time work. This leads to occupational segregation between full- and part-time workforce.

2.5 Differences in occupations : an overview⁴⁵

Occupational segregation refers to "a situation where groups, ... tend to work in a different set of occupations."⁴⁶ One measure of occupational segregation is the index of segregation⁴⁷. This measure has one limitation in that it does not account for variations from within occupations. For example, in the professional category, males are well represented as engineers, dentists, veterinarians whilst females are poorly represented in these groups and well represented in categories such as librarians, teachers and nursing.

Obviously the degree of segregation is subject to the level of aggregation of occupational groups. A number of studies have estimated the degree of segregation which exists when a large number of occupational categories are analysed⁴⁸. The approach adopted in this thesis is to investigate the effects of occupational distributions on wage

⁴⁵ Derived from Blau, F.D., Ferber, M.A.,(1986), p152-181

⁴⁶ Blau, F.D., Ferber, M.A.,(1986), p158-59

⁴⁷ Duncan, O.D., Duncan, B.,(1955), 210-217.

⁴⁸ Beller, A.H., (1984)

outcomes⁴⁹, rather than simply estimate an index of occupational segregation based upon sex and labour force status.

Job segregation differs from occupational segregation in that individuals may be equally represented in an occupation but not share the same jobs. Blau (1977) conducted a study which revealed that within clerical occupations which are integrated by sex, males were more likely to be found in high-wage firms. If institutions are important then two opposite effects may be occurring. First, customs and traditions may stereotype females into certain jobs. Second, legislative controls may encourage more diversity than the perfect market would normally produce. The stylised facts are that part-time workers are more likely to have less diversity in their jobs, and females are likely to be more segregated than males.

Three broad reasons are presented to explain why certain groups are concentrated into specific segments of the labour market. First, if one group earns less than the other, it may be argued this results from their choice of occupation. Second, it could be argued that certain groups are explicitly excluded from certain jobs. Finally, the wages which accrue to a particular job are low (high) as a result of the type of employees concentrated in that job. Each of these explanations will be discussed further.

2.5.1 Choice of jobs which offer less pay

As noted by Treiman *et. al.* (1981) there are four basic reasons why females may choose jobs which have lower pay than those chosen by males.

⁴⁹ For a comprehensive treatment of occupational indexes in Australia see Jones, F. L., (1991) and Jones, F. L. (1989)

Firstly, females may be conditioned to believe that some jobs are appropriate for females, and do not pursue jobs they are conditioned to believe are male jobs. Secondly, training and education patterns of females do not equip them for a broad spectrum of jobs. Thirdly, females lack the information on available jobs, their pay, conditions and access to them. Fourthly, females may be aware of other jobs, but as a result of actual or predicted family obligations (such as being the primary care giver), structure their career plan into occupations which accommodate these factors.

Mincer and Polachek (1974, 1978) and Polachek (1976,1979) suggest that family roles may lead to two effects on females' choice of jobs. One effect is that they choose jobs with limited opportunities and relatively poor pay as a result of their intention to quit once they marry or begin raising children. In other words they are unwilling to undertake the investment necessary for a high paying job. Alternatively, in the expectation of returning to work after their child rearing responsibilities cease, they choose jobs which are relatively easy to leave and re-enter, the type of jobs which do not require the continuous accumulation of skills and therefore do not have a steep earnings profile. Once again, they choose not to invest in high levels of education. Jobs which require low levels of education, allow entry and exit with the least amount of human capital depreciation and as well as allowing flexibility for family responsibilities are particularly relevant to those on part-time schedules.

Oppenheimer (1970) argued that as a result of family responsibilities females choose occupations which have limited demands including restricted hours, no overtime work, no travel. It is argued that females fail to take advantage of promotional opportunities if this means they will lose these job characteristics.

Finally, although females may be aware of job alternatives but they choose not to acquire the necessary skills for these jobs, nor will they accept promotion to they jobs. The underlying causes of this outcome are a result of actual or perceived discrimination.

2.5.2 Direct discrimination preventing groups from working in high pay jobs

Discrimination in this context may refer to either direct exclusion (such as females being prevented from certain occupations in the military) or a restriction in opportunities for promotion (such as promotions being partially determined by the length of continuous tenure thereby excluding primary care givers of families).

Some employers may interpret an individual's request for part-time work as an indication of lower workforce enthusiasm and attachment. As result, it may be argued that just as employers perceive female's potential family responsibilities as a negative asset to the firm, and hence use this as a means of screening them from higher paid management positions, part-time work for both sexes may be similarly treated.

This factors is perhaps the most widely discussed determinant of differences in wages and representation of one group over another. If there exists differences in the level of discrimination which affect certain groups access to different occupations this process is sufficient to produce wage differentials between groups. This arises as a result of the importance of occupations in affecting the wages individuals receive.

There have been several theories developed which attempt to explain the underlying causes of discrimination⁵⁰. Becker (1957, 1971) developed a model of discrimination which is based on the notion that the

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Arrow, K.J.,(1972)

"tastes" of employers and employees are the motivating force behind discrimination. The effect of this taste for discrimination may be ameliorated through compensation. In the case of wages, employers may reduce female wages relative to that of males (or alternatively, increase male wages relative to females) to compensate themselves for their natural disinclination to hire females. Similarly, employers may believe female part-time workers should be at home caring for their child, or do not take their work seriously, and hence may compensate themselves for these factors by lowering the wage of part-time workers. Becker argued that in the case where these compensations are made, resources are being allocated inefficiently, and, in a perfectly competitive market, these inefficiencies would cause discriminating firms to disappear in the long run, thereby eliminating any wage or price differentials which may exist.

In an alternative model, Bergmann (1971, 1974) uses the examples of race and sex discrimination in her model of discrimination. The initial assumption is, like Becker, that employers have some distaste for hiring women or minority groups. In the Bergmann model, the distaste against these groups is so strong that employers explicitly exclude them from jobs. This exclusion leads to an oversupply of the excluded groups to jobs which are deemed appropriate, and it is this excess supply which forces wages down for these jobs relative to their earnings capacity if no discrimination, in the form of occupational segregation, occurred. Since there is a restriction of the movement of workers into jobs where they may have a competitive advantage, resources are not being efficiently allocated. Although this model does not require the somewhat restrictive neoclassical assumptions of the Becker model (such as perfect information, mobility and competition), it has the same conclusion that in the long run discrimination will disappear as a result of the unprofitable effects of excluding the most efficient workers from employment.

The type model of discrimination is a series of models which may be collectively identified as statistical discrimination⁵¹. Statistical discrimination occurs when employers discriminate against the perceived negative characteristics of a group as a type of screening mechanism in their employment practices irrespective of the attributes of the individual. In this model, if part-time workers or females are perceived to have higher turnover and hence higher training costs than full-time and males respectively, then this may result in employers being reluctant to employ these groups if all groups were equally available. Additionally, if part-time workers are believed to be less motivated than full-time workers, employers will be less likely to hire individuals who seek part-time work.

This model suggests that employees from the groups perceived as less-desirable will obtain jobs where factors for which the group is regarded as undesirable such as turnover costs are less important. An example would be low-skill jobs. Alternatively, the less-desirable group may obtain some representation in high skill jobs if the wage rate is flexible enough to allow employers to compensate themselves for the additional risk of employing these individuals. Thus, this model also includes an explanation for occupational segregation.

Therefore in this type of discrimination model, employers do not necessarily have a taste for discrimination. However, they believe they are minimising the costs of screening potential employees by eliminating individuals on the basis of the perceptions of the group. The implication is of course, that if these perceptions are incorrect, or if the employer could identify members of the group which were atypical, then it would be advantageous for the employer not to employ statistical discrimination. As a result, in the long-run, employers who evaluate individuals rather than

⁵¹ Phelps (1972)

groups in their selection criteria will be compensated through more productive workers (which exceed the initial screening costs), and hence have a competitive advantage over discriminating employers.

2.5.3 Underpayment as a result of over representation

A third explanation of the effects on certain groups when they are concentrated into specific segments of the labour market revolved around wages which accrue to particular segments. Essentially the argument is that certain groups have lower rates of pay due to excess supply of workers into that segment. It is important to understand that this does not necessarily apply only to unskilled workers. This point is perhaps best illustrated through the use of an example.

Historically in Australia, teachers earned an above average rate of pay relative to the community at large. But teachers relative pay has declined since the 1960s. The obvious question is why? One explanation is that before this time, females were forced to resign from their position once married. As a result the number of female teachers was relatively low. Today, in all States females are no longer discriminated against on the basis of marital status. As a result a significant proportion of teachers are married women. Although the relationship between the relative pay and the number of females in a given occupation may not be causally related, it is perhaps reasonable to assume that married women are less militant on industrial relations matters as a result of their income generally being a second household income, and as a result the relative wages of teachers has fallen as the proportion of married women in teaching has increased.

The relevance of this point to part-time workers may be observed in retail sales. As a result of the peak-period demands which occur in retail sales, many jobs in this occupation are part-time. Additionally, many of the

employees in this area are young workers without family responsibilities. Many individuals regard the earnings from this work as discretionary. As a result of the large numbers of young potential workers, the discretionary nature of existing worker's earnings, and low levels of organisation, this sector is prone to industrial action and hence the relative wages of the employees is relatively poor.

2.6 The role of institutional factors in Australia and the United States

So far we have discussed how the characteristics of individuals and the jobs they hold may affect wages, and outlined the respective legislation affecting wages of men and women working full- and part-time in Australia and the United States. Now we shall consider the role institutional arrangement have in wage determination. This is particularly important for Australia with it's centralised bargaining system.

In a perfectly competitive labour market, both the demand and supply of labour is undertaken within the framework of perfect mobility and complete information. Wages are determined through the interaction of supply and demand for each worker, and is equivalent to their marginal revenue product (MRP). However, labour is rarely supplied under these conditions with individuals usually unaware of all the market opportunities, and are unlikely to have perfect mobility. On the demand side, employers are rarely able to advise all possible employees of the job opportunities, in employment they may be constrained in the wage they offer individuals (which may be unrelated to a worker's MRP) through custom, agreement or institutional factors.

Major institutional constraints include centralised bargaining (where a State or Federal Industrial Court determines the wages for specific occupations, and aggregate pay increases to adjust for factors such as cost of living), promotion from within the firm (which continues to exist in the

Commonwealth Public Service), union agreements on hiring/firing processes and award rates of pay, and the segmentation of the labour market into non-competing groups (on the basis of sex, race, disabilities, ethnicity and age).

The history of equal pay and equal employment opportunities for Australia⁵² and the United States is provided in Table 2.4. The differences in each country's legislative agenda regarding equal pay (which for the United States, excludes the notion of equal pay for work of equal value) and anti-discrimination provide the foundation for a unique analysis of the implications of institutional constraints on labour market outcomes.

As a result of Australian equal pay and equal employment opportunities, from the 1969 Commonwealth Conciliation and Arbitration Commission judgement, sex was not used as a wage criterion except in those jobs which were predominantly female. Before this decision, males undertaking the same work as females were generally paid more. In 1972, this decision was widened to include the concept of equal pay for work of equal value. This meant that female dominated occupations were now covered by the equal pay for equal work principles.

The 1972 decision was introduced in three steps from December 1973 to June 1975. The minimum female award was adjusted to 85 percent of the male minimum award in May 1974, to 90 percent in September 1974, and to 100 percent in June 1975. In 1974, the Commission extended to females the protection of the male minimum award wage, which represented the lowest wage that could be legally paid in any male award classification. Thus, between 1973 and 1975, women increased their award minimums from 75 to 100 percent of the male minimum award.

⁵² The discussion applied to Commonwealth legislation. States have their own industrial system.

After 1975, the Commission ruled that awards rates for all work should be determined without consideration of the sex of the employee.

For the United States, despite a larger earning's gap between male and females than Australia, Federal legislation aimed at achieving equal pay for women has been observed to have a small impact⁵³. State government initiatives have been argued to have been more successful⁵⁴.

Discrimination has been defined as

the effect of an action, policy or practice which selects a class of persons to receive unequal treatment. Discrimination may involve a single act or it may be a continuing policy or practice. Discrimination may be intentional or unintentional; purpose of intent is irrelevant when the effect of a particular action, policy or practice is to deny equal opportunity. Similarly, discrimination may be overt (that is, using sex to discriminate openly) or covert (that is, when a mechanism indirectly related to sex or race is used to discriminate)⁵⁵

The *Sex Discrimination Act (1984)*, enacted by the Commonwealth of Australia, and applying to all States, covers unlawful discrimination on the grounds of sex, marital status and pregnancy. It also contains provisions which make sexual harassment unlawful. The legislation is intended to provide a framework by which complaints may be assessed for their validity by either conciliation or arbitration. The Act covers discrimination existing in employment, education, goods, services, facilities, accommodation, land, clubs, Commonwealth laws and programs and application forms. Exceptions to the Act include genuine occupational qualifications, superannuation and insurance.

In 1984, the Commonwealth amended the *Public Service Act (1922)* to include equal employment opportunity (EEO) legislation. Although the Public Service Board had encouraged voluntary adoption of EEO

⁵³ Beller, A.H.,(1979)

⁵⁴ Evans, S.M., Nelson, B.J.,(1989)

⁵⁵ US Commission on Civil Rights (1976), p164

TABLE 2.4: Equal pay and equal employment opportunity policies

Country	Year	Implementing Authority	Enforcement Authority
Australia			
Equal pay for equal work	1969	Conciliation and Arbitration Commission	Conciliation and Arbitration Authority
Equal pay for work of equal value	1972	Conciliation and Arbitration Commission	Conciliation and Arbitration Authority
Minimum wage	1974	Conciliation and Arbitration Commission	Conciliation and Arbitration Authority
Equal Employment Opportunity	1984	Sex Discrimination Act	Sex Discrimination Commissioner
	1984,1987	Public Service Act Amendments	Public Service Commission
	1986	Affirmative Action Act	Human Rights and Equal Opportunities Commissioner; Affirmative Action Agency
United States			
Equal Pay	1963	Equal Pay Act	Equal Employment Opportunity Commission (EEOC)
Equal Employment Opportunity	1964	Civil Rights Act, Title VII	Equal Employment Opportunity Commission (EEOC)
	1968	Executive Order 11375	Office of Federal Contract Compliance Programs
	1972	Equal Employment Opportunities Act	Equal Employment Opportunity Commission (EEOC)

Source : Derived from Table 5.11, p 168 OECD Employment Outlook, September 1988

principles, the legislative controls became effective on 1 October, 1984. Approximately one year was allowed for all Commonwealth departments and statutory authorities with public service employees to prepare an EEO program as prescribed by the Act, for their respective employees.

Under section 22B of the Act, an equal employment opportunity program should ensure that appropriate action is taken to eliminate unjustified discrimination against women and persons in designated groups in relation to employment matters. The Act directs departments to undertake measures to enable women and persons in under-represented groups to compete for promotion and transfer and pursue careers as effectively as other persons.

As for Australia, there is more than one affirmative action programs operated by the US government⁵⁶. These include the Office of Federal Contract Compliance Programs under Executive Order 11246, programs administered by the Equal Employment Opportunity Commission (EEOC) under Title VII of the *Civil Rights Act (1964)* and under voluntary Affirmative Action Guidelines issued by the EEOC. Additionally, there are Federal Government run programs covering federal employees.

The two major United States federal laws covering employment discrimination are the *Equal Pay Act (1963)* and the *Civil Rights Act (1964)*. The *Equal Pay Act (1963)* is an amendment of the *Fair Labor Standards Act*, and focuses upon the issue of equal pay for men and women doing equal work. The Act describes equal work as that requiring equal skill, effort, and responsibilities being performed under similar working conditions. The *Equal Pay Act* states

No employer having employees subject to any provisions of this section shall discriminate within any establishment in which such

⁵⁶ Further information on these programs, and judicial precedents may be found in Office of the Status of Women (1985)

employees are employed, between employees on the basis of sex by paying wages to employees in such establishment for equal work on jobs the performance of which requires equal skill, effort and responsibility, and which are performed under similar working conditions, except where such payment is made pursuant to (i) a seniority system (ii) a merit system (iii) a system which measures earnings by quantity or quality of production, or (iv) a differential based on any other factors other than sex: provided, that an employer who is paying a wage rate differential in violation of this subsection shall not in order to comply with the provisions of this subsection, reduce the wage rate of any employee.⁵⁷

The *Equal Pay Act* was partially incorporated into the Title VII of the *Civil Rights Act (1964)* via the Bennett Amendment, which stated *inter alia*

It shall not be an unlawful employment practice under this title for any employer to differentiate upon the basis of sex in determining the amount of the wages or compensation paid or to be paid to employees of such employer if such differentiation is authorised by the provisions of [the Equal Pay Act]⁵⁸

This judgement was interpreted differently by different groups. It was not until 1981 when the U.S. Supreme Court ruled in *County of Washington et. al. v. Gunther et. al.*⁵⁹ that claims for sex-based wage discrimination can also be brought under Title VII even when no member of the opposite sex holds an equal but higher paying job, provided that the challenged wage rate is not exempted under the *Equal Pay Act's* affirmative action defences.

As noted earlier the *Equal Pay Act* of the United States does not have employment legislation which enforces the principle of equal pay for work of equal value. An exception is the federal *Civil Service Reform Act (1978)*, where, in the section dealing with merit system principles, states "Equal pay should be provided for work of equal value"⁶⁰

⁵⁷ 29 U.S.C. 206(d)(1)(1970)

⁵⁸ Brackets added

⁵⁹ 80 U.S.C. 429

⁶⁰ 5 USC 2301(b)(3)

2.7 Conclusion

This chapter surveyed theories which may assist in understanding the reasons the average male wage per hour exceeds the average female wage per hour, and also why full- and part-time hour wages differ. These theories lead to the prediction that full-time hourly wages should exceed part-time hourly wages as a result of three factors. Firstly, human capital theory predicts that part-time workers will invest in lower levels of education, receive less on-the-job training and have less experience than full-time workers.

Second, segmented labour market theories predict that in cases where there exists differences in the level of education and training the labour market may be divided into a primary and secondary sectors. The full-time market may be characterised as a sector which typically has defined career paths, promotion possibilities and employment security indicate it may be classified as a primary sector. For the primary sector, segmented market theories predict an wage above a competitive minimum to occur, whilst for the secondary market, wages are predicted to be depressed.

Thirdly, efficiency wage theories contribute to our understanding of wage differentials by four major contributions. If part-time workers are regarded as 'bad' workers in terms of motivation and skill, then it is predicted that the wages part-time workers receive would be lower than full-time workers. Also, since the training costs of part-time workers are at least equal to full-time workers, firms are likely to attempt to recoup any difference by lowering the wage of part-time workers relative to those working full-time. Additionally, since part-time workers have non-standard hours the costs of monitoring would be higher than for full-time workers, and hence employers would attempt to recover these additional costs by lowering the wages of part-time workers. Finally, as a result of

the very nature of some jobs, they lend themselves to either full- or part-time work. As a result of this occupational segregation, and differences between occupations of factors such as unionisation wages differ between full- and part-time work.

The important point to recall, is that each of these theories predict full-time wages to exceed part-time wages. For most countries it was demonstrated that the empirical findings are consistent with the theory. However, Australia was identified as being different from the international experience. This suggests that Australia has factors which affect the male/female wage ratio and the full/part-time wage ratio which are not present in other countries such as the United States. One possible explanation is Australia's unique institutional arrangements. The chapter concluded with an examination of equal pay and sex discrimination legislation in Australia and the United States.

CHAPTER THREE

OVERVIEW OF PART-TIME WORK IN AUSTRALIA

3.1 Introduction

This chapter examines some of the characteristics of Australian part-time workers and the institutions which affected part-time work in 1986. This year was chosen as cross-sectional data utilised in subsequent chapters is derived from this year. In Australia, most jobs have award conditions which may specifically differentiate between full- and part-time schedules. As discussed later in the chapter, where part-time conditions are specifically incorporated into an award, pay and conditions are dependant upon whether the worker is appointed on a permanent or casual basis. Although permanent part-time workers receive the pro-rata payments of full-time workers, casuals may receive a premium of between 20 to 33 percent to compensate for lack of full-time benefits (including annual, sick and long service leave) or to discourage employers from using casual labour. Additionally, the award system may negatively effect part-time employment whereby employment other than permanent full-time is expressly prohibited¹. This chapter seeks to complement the existing knowledge of full-time working arrangements under an institutionally based system such as Australia's by documenting significant institutional arrangements for part-time workers which may impact on their work and wages.

¹ This is most applicable for male-dominated industries.

3.2 What does part-time mean ?

Part-time work is a generalised term commonly applied to individuals who work less than 35 hours per week including permanent, casual and temporary workers. The Australian Bureau of Statistics (ABS) in both its monthly Labour Force Survey, and the Population and Housing Survey (Census) 1986 distinguish between full- and part-time workers on the basis of hours usually worked per week. A full-time schedule is defined to exist when an individual usually works more than 35 hours per week.

Despite the commonly identified division between full- and part-time work, there exists several sub-groups of part-time work. The major sub-groups are permanent, temporary, casual, outworkers and occasional part-time workers. The distinguishing features of each group which are identified in Australian awards shall be discussed in turn.

Permanent part-time usually refers to the work status of individuals whose hours of work per week may fluctuate from week to week, but who work less than 35 hours in any given week, and accrue pro-rata full-time benefits such as paid holiday leave and job security. Permanency in work, whether full- or part-time is usually attributed to individuals who work under conditions of employment where no limitations or reservations have been expressed by the employer about the possible tenure in that job. As for most types of full-time work, the continuation of employment of a permanent part-time worker is subject only to minimum standards of performance.

Temporary part-time workers usually work less than 35 hours per week, have access to paid holiday leave but usually do not have any job security. This category also consists of workers on full-time hours, that is 35 or more hours per week, for part of the year. An obvious example of this type of work is seasonal fruit and vegetable picking. Employment in temporary part-time

work is often based upon the completion of a specific task. For example, most contract labourer can be regarded as temporary part-time workers.

A casual employee is one whose employment does not carry with it the guarantee of a full week's work each week of the year. Thus, such employees do not have tenure with an employer as each work period (usually a fortnight) is a separate and distinct period of service. Casual workers usually do not have the non-pay benefits which are payable to other workers. These benefits include sick leave, annual leave² and long service leave³. In cases where individuals do not receive these benefits, some awards provide for a pay loading for casual employees.

Industrial tribunals have justified the existence of casual loadings on two major grounds. Firstly, the loading exists to compensate the employee for the lack of normal employment benefits available to other workers. Secondly, loadings are intended to deter employers from employing casuals at the expense of permanent employees. The actual entitlement of casual workers to overtime, public holiday loadings and superannuation⁴ depends upon the terms of the relevant award. Some awards ensure that casuals are treated similarly to permanent employees in terms of incremental salary progressions.⁵ In New

² Casuals are entitled to annual leave under some awards, see *Re Food Shops Award and Other Awards* 1984 AILR 221, where accrual is based upon the hours worked. Exception to this rule is Queensland where casuals may be excluded from annual leave entitlements provide under Queensland Industrial Relations Awards (QIRA), however, awards can stipulate annual leave entitlements, see Case No. C2 1963; *Re Miscellaneous Workers Award - St* 1987 AILR 127 where it was decided that female casuals were entitled to annual leave.

³ In New South Wales, *Sheppard v. TAB* 1989 AILR 351, it was deemed that long service leave was not available to casuals under pre 1985 law, from 1985 amendments were made to allow casual employees to accumulate periods employed by the same employer under separate contracts with one employer. This precedent has been upheld by subsequent decisions including *Kable v. Magnamail Pty Ltd* 1990 AILR 99 where long service leave was deemed appropriate to casual employees but not respective of 1985 amendment.

⁴ One precedent for casuals eligibility is *FLAIEU v. Registered Clubs of Tas. & Anor* 1988 AILR 38.

⁵ See *Re Cr Teachers (Casual) Award* 1984 356

South Wales, casual employees usually receive, in addition to their casual loading, one twelfth of a years salary for their period of employment ⁶. Table 3.1 provides estimates of the extent of casual loading under Federal and Victorian Awards.

Casual work may be divided into regular and irregular components. For both types of casual workers, the hours of work are usually less than 35 hours per week. Usually they do not receive pro-rate full-time benefits such as paid

TABLE 3.1 : Casual loadings in a sample of Australian Awards

Loading	Number of Federal Awards	Number of Victorian Awards
Not Specified	33 (7.3)	n.a.
less than 15%	17 (3.7)	n.a.
15 %	33 (7.3)	3 (5.0)
15 - 20%	18 (4.0)	n.a.
20 %	250 (55.1)	17 (28.3)
20 - 25%	4 (0.4)	n.a.
25 %	70 (15.4)	18 (30.0)
25 +	29 (6.4)	22 (36.67)
TOTAL	454 (100.0)	60 (100.0)

() brackets denote percent of total; n.a represents not applicable

Source : Specialist Research Services (1986) as quoted in Lewis (1990) Tables 28,29, p108

⁶ To satisfy section 4(3)(b)(ii) of the *Annual Holidays Act, 1944*.

holiday or sick leave but instead are paid only according to the number of hours worked. The distinction between the two groups is that regular casuals can expect a steady income stream throughout the year, whereas irregular casuals have a volatile income stream due to fluctuations in the hours required per week. For both groups employment is usually undertaken on an "as required" basis.

An additional group of workers which may be defined within part-time work are outworkers. Remuneration of outworkers is based upon per unit output rather than hours of work. Work is generally done away from the employer's premises (usually in an individual's home). This type of work is most commonly associated with industries such as clothing, textiles and footwear.

Occasional part-time work is sometimes referred to as casual full-time. Occasional part-time employees are required as a result of unforeseen demand for labour changes or as temporary relief for employees on leave. As a result of these factors, occasional part-time workers do not have any form of job security. To be regarded as an occasional worker, employees must not have worked full-time for all of the preceding 12 months and not be entitled to paid holiday leave. Occasional workers include "on call" workers, common in the sales and service sectors, and individuals employed as temporary relief agency workers.

3.3 Demographic characteristics of part-time workers in Australia

One advantage of part-time work is the flexibility it provides through the timing and number of hours worked per week. This flexibility allows individuals to meet demands of other activities including family responsibilities. Table 3.2 provides estimates of the age profile of part-time

workers by sex and marital status. The age profile of full-time workers is also provided for comparative purposes.

Male participation in part-time work is highest for the youngest and oldest workers. For married females, part-time work is dominant in the principal child-rearing years of 25-44 years. Indeed, in 1986 the number of married females aged 35-44 engaged in part-time employment exceeded the number in the corresponding full-time group. In analysing participation of females by full- and part-time workforce status, we may observe that except for the very young and old, part-time work is dominated by married females. Unmarried females have a similar age profile of part-time work to males.

Although the marital status and age profile help us to develop some general perceptions of part-time workers, analysing the family status of those females who work in the paid labour market allows us to confirm or reject the proposition that part-time work is a system of work which allows females to simultaneously meet family responsibilities as primary care givers whilst remaining attached to the labour force. Table 3.3 identifies the family status of females working full-and part-time.

The comparison between married and unmarried females with dependents in the full-time labour market is quite different, with the majority of unmarried females with dependents working full-time, whilst the majority of married females with dependents work part-time. For employed females who are not a member of a family, approximately 80 percent work full-time. In Table 3.3, we may observe that for part-time workers, females who are married, and have dependents dominate all hourly ranges of part-time work. For unmarried females, those with dependents are more likely to work full-time than part-time.

TABLE 3.2 : Age profile of full- and part-time workers, Australia, 1986

	Age group ('000)							Total	
	15-19	20-24	25-34	35-44	45-54	55-59	60-64		65 +
Males									
Full-time	238.8	476.8	1103.4	1006.6	658.8	252.5	130.5	34.3	3901.6
(per cent)	(6.12)	(12.22)	(28.28)	(25.80)	(16.89)	(6.47)	(3.34)	(0.88)	(100.00)
Part-time	87.5	40.1	41.4	27.2	24.5	17.5	15.9	24.0	278.2
(per cent)	(31.45)	(14.41)	(14.88)	(9.78)	(8.81)	(6.29)	(5.72)	(8.63)	(100.00)
Total	326.3	516.9	1144.8	1033.8	683.3	270.0	146.4	58.3	4179.8
Married Females									
Full-time	7.5	105.1	266.6	277.8	172.2	33.3	14.3	4.4	881.2
(per cent)	(0.85)	(11.93)	(30.25)	(31.53)	(19.54)	(3.78)	(1.62)	(0.50)	(100.00)
Part-time	*	30.8	232.9	282.7	155.8	43.8	17.0	5.7	770.1
(per cent)	*	(4.00)	(30.24)	(36.71)	(20.23)	(5.69)	(2.21)	(0.74)	(100.00)
Total	9.0	135.9	499.5	560.5	328.0	77.1	31.3	10.1	1651.4
Females									
Full-time	186.2	360.8	455.3	367.7	228.9	51.1	22.2	8.5	1680.7
(per cent)	(11.08)	(21.47)	(27.09)	(21.88)	(13.62)	(3.04)	(1.32)	(0.51)	(100.00)
Part-time	114.8	77.0	263.2	314.1	171.4	51.4	22.9	10.4	1025.2
(per cent)	(11.20)	(7.51)	(25.67)	(30.64)	(16.72)	(5.01)	(2.23)	(1.01)	(100.00)
Total	301.1	437.8	718.4	681.8	400.3	102.5	45.1	18.9	2705.9

(per cent) refers to percentage representation of that age group to the total group

Source :

ABS (1986)

Labour Force Survey, Australia, August 1986

Cat. No. 6203.0

TABLE 3.3 : Family Status of females working full- and part-time, June 1986, Australia

	Full-time worker	Part-time worker			Total	Average weekly hours by		
		0 (a)	1-14	15-34		ft workers	pt workers	total
Member of a family	1301.8	45.3	423.1	486.1	954.5	36.4	15.0	27.3
Wife	833.3	37.2	303.8	412.1	753.1	36.9	15.6	26.7
dependents present	393.5	24.3	230.9	283.1	538.4	37.2	15.1	24.4
dependents not present	439.8	12.8	72.9	129.0	214.7	36.5	16.8	30.0
Not married family head	102.4	*	21.4	30.7	55.0	36.7	16.0	29.5
dependents present	66.1	*	18.3	22.9	42.9	36.7	15.6	28.4
dependents not present	36.3	*	*	7.8	12.2	36.6	17.4	31.8
FT student aged 15-24 (b)	*	4.4	85.2	8.9	98.4	39.8	7.7	8.3
Other child (c) of family head	339.4	*	11.8	31.1	43.5	35.3	19.7	33.5
Other relative of family head	24.6	*	*	*	4.4	36.5	18.9	33.8
Not a member of a family	290.0	*	21.8	35.4	60.5	36.7	16.6	33.3
Living alone	128.3	*	9.2	14.8	25.7	36.8	16.5	33.4
Not living alone	161.7	*	12.6	20.6	34.9	36.7	16.8	33.2
Total	1591.8	48.6	444.9	521.5	1015.0	36.5	15.1	28.1

Source :
 ABS (1987)
 Labour Statistics, Australia, 1986
 Cat. No. 6101.0, Table 2.24, p24

Comparing the average number of hours worked by married and unmarried females reveals that although the average number of hours worked in full-time jobs is similar, those individuals without dependents employed part-time, work around 2 hours a week more than those individuals with dependents. One possible explanation for this is the limited supply of child care⁷.

Table 3.4 shows the average number of hours worked for five different types of part-time work. The most important groups, in terms of number of employees is permanent and casual part-time workers. For permanent part-time workers, both the mean and median number of hours worked per week is around 24 hours. For casuals, the mean and median is around 15 hours. Estimates of

TABLE 3.4 : Total hours worked by type of part-time workers, South Australia 1986 *

PERSONS	MEAN (a)	MEDIAN (b)
Non-permanent full-time	43.1 (1.3)	40.0 (1.6)
Permanent part-time (c)	23.8 (0.4)	24.0 (0.6)
Regular Casual	14.8 (0.4)	15.0 (0.6)
Irregular Casual	16.8 (0.6)	15.0 (1.2)
Other part-time	13.9 (0.9)	13.0 (1.5)
TOTAL	18.3 (0.3)	18.0 (0.5)

* Data based upon a sample of 106,521 South Australian workers.

(a) brackets represent standard error of mean.

(b) brackets represent standard error of median.

(c) includes temporary part-time workers

Source : ABS (1986), Type and Conditions of Part-time Employment, South Australia, October, Cat. No. 6203.4, Table 4.

the respective representation of each of these groups in the Australian workforce is provided in the following section.

3.4 Institutional arrangements affecting part-time employment

In any analysis of the Australian wages it is important to understand the distinction between employees covered and not covered by an award. Non-award covered workers are employed (generally) on some privately negotiated contract which is subject to some minimum standards of pay and conditions. Workers employed under awards have their pay and conditions determined by an industrial tribunal which may be State or Federal. Non-award workers generally rely on common law for their rights and obligations, although some provisions pertaining to minimum standards and conditions from awards do apply. In referring to the distinction between covered and non-covered sectors, Brooks (1985) states :

Award regulated employees are invariably trade union members whose union has created a legalistic industrial dispute, which has been processed through industrial tribunals. The settlement to the industrial dispute is an award binding upon employer respondents to the award ... no employer respondent to an award may offer wages and conditions below the minimum standard prescribed by the relevant award ⁸.

When part-time work is identified in an award, usually it is to specify the unique conditions which allow part-time work in a particular industry. Table 3.5 identifies for males and females in Australia, the incidence of award coverage for 1983⁹.

⁸ Brooks, B., (1985), p164.

⁹ This survey was not available for 1986.

Using Table 3.5 it may be observed that for both full- and part-time workers, males and females, around 90 percent of individuals who work, are covered by some form of institutionally determined non-managerial wages and conditions. A further breakdown of award coverage between types of part-time workers is available from a South Australian survey of part-time workers.

From Table 3.6 we may note that only about half of the part-time workers were definitely covered by some form of award. The remaining portion was divided between those who were definitely not covered, and those unsure of their coverage status. The division between the coverage groups appear from this survey to be comparable for the most important types of part-time work - permanent and regular casual part-time. Tables 3.5 and 3.6 may be reconciled by recalling that Table 3.5 utilises employer provided information, whilst the South Australian survey is based upon individual sampling of households. Although the sample size for the South Australian data is large and the survey was conducted by the Australian Bureau of Statistics, the divergence between the findings of Tables 3.5 and 3.6 highlight the need for caution in extrapolating from this survey into an Australia-wide context.

Table 3.7 provides some indication of the age profiles of the different types of part-time workers. As illustrated in Table 3.2, most males working part-time are at either end of the age distribution. Table 3.7 reveals that most young males working part-time do so on a casual basis. As for males, Table 3.5 also supports the evidence provided in Table 3.2, that the majority of females working part-time are to be found in the age groups mainly responsible for child rearing.

TABLE 3.5 : Incidence of awards by employee category. Australia, May 1983

Employee Category	Number of Employees ('000s)	Covered by awards, determinations and collective agreements			Not Covered by award
		Federal	State	Total	
Males					
				-per cent -	
Adult	2753.8	42.5	39.4	82.5	17.5
Managerial, etc.	417.1	22.4	19.4	42.1	57.9
Non-managerial	2336.7	46.1	43.0	89.8	10.2
Full-time	2150.2	47.5	42.3	90.5	9.5
Part-time	186.2	29.4	51.5	81.4	18.6
Juniors	274.0	37.9	55.9	94.2	5.8
Full-time	215.8	45.5	50.3	96.0	4.0
Part-time	58.2		76.6	87.6	12.4
Total	3027.8	42.0	40.9	83.6	16.4
Managerial, etc.	417.1	22.4	19.4	42.1	57.9
Non-managerial	2610.7	45.3	44.3	90.3	9.7
Full-time	2366.0	47.4	43.0	91.0	9.0
Part-time	244.7	24.8	57.5	82.8	17.2
Females					
Adult	1724.5	24.3	63.5	88.4	11.6
Managerial, etc.	108.1	11.4	44.9	56.9	43.1
Non-managerial	1616.4	25.2	64.7	90.6	9.4
Full-time	1048.7	29.8	63.0	93.5	6.5
Part-time	567.8	16.7	67.8	85.1	14.9
Juniors	294.8	19.7	77.0	96.9	
Full-time	203.7	25.5	71.2	96.7	
Part-time	91.1		90.1	97.2	
Total	2019.3	23.7	65.4	89.7	10.3
Managerial, etc.	108.1	11.4	44.9	56.9	43.1
Non-managerial	1911.2	24.4	66.6	91.5	8.5
Full-time	1252.4	29.1	64.4	94.0	6.0
Part-time	658.8	15.4	70.9	86.8	13.2

Source :

ABS (1983), Incidence of Industrial Awards, Determinations and Collective Agreements, Australia, May, Cat. No. 6315.0

It should be noted that Tables 3.6 and 3.7 represent evidence from South Australia only. Table 3.8 provides evidence on a national basis regarding the preferences females have expressed for these types of part-time work. Also, the South Australian data is derived from a survey of individuals. Aggregate data is derived mainly from a survey of employers. Therefore differences often occur between these types of survey as a result of persons being unaware of their exact employment status.

**TABLE 3.6: Award coverage by type of part-time work,
South Australia, 1986**

Work Type	Covered		Not Covered		Total
	Knows award	Award not known	Knows not covered	Not know if covered	
Non-permanent full-time	1827	1262	1361	867	5317
Permanent part-time (a)	10126	7552	2747	3452	23877
Regular Casual	16313	14013	10695	15365	56386
Irregular Casual	4027	4211	3427	2717	14382
Other part-time	*	*	4738	863	6559
TOTAL	32713	27576	22968	23264	106521
	(30.7)	(25.9)	(21.6)	(21.8)	(100.0)

(a) includes temporary part-time workers; * sampling error too high for reliable estimates.

Source : Derived from ABS (1986), *Type and Conditions of Part-time Employment*, South Australia, October, Cat. No. 6203.4, Table 8, p 15.

**TABLE 3.7 : Type of part-time work by age and sex, South Australia,
October 1986**

Type	15-24 yrs	25-34 yrs	35-44 yrs	45+ yrs	Total
MALES					
Non-permanent full-time	1218	731	*	987	3363 (16.6)
Permanent part-time (a)	*	*	*	*	1226 (6.1)
Regular Casual	5427	1455	*	1171	8517 (42.0)
Irregular Casual	1795	*	*	948	3071 (15.1)
Other part-time	1302	780	919	1092	4094 (20.2)
TOTAL	10073	3519	2144	4537	20272 (100.0)
FEMALES					
Non-permanent full-time	*	951	*	*	2281 (2.5)
Permanent part-time (a)	1953	6416	8812	5585	22766 (24.8)
Regular Casual	11706	12958	12801	10719	48184 (52.4)
Irregular Casual	3128	3204	3500	2335	12167 (13.2)
Other part-time	*	2584	1595	1703	6499 (7.1)
TOTAL	17996	26114	27226	20560	91896 (100.0)

(a) Includes temporary part-time; () represent percent of total; * sampling error too high for reliable estimates.

Source : ABS (1986), *Type and Conditions of Part-time Employment*, South Australia, October, Cat. No. 6203.4, Table .

TABLE 3.8: Preference for casual or permanent work (a), by usual hours worked per week, females, Australia, 1982

	Usual hours worked per week (in main job) (000)								Total
	10-19	20-29	30-34	35	36-39	40	41-48	49 +	
Permanent worker -									
Preferred permanent	47.5	79.4	80	110.1	271.9	621.2	120.4	55.6	1386
Preferred casual	6.8	9.5	6.5	9.1	17.9	45	8.7	6.3	109.8
Undecided	*	*	*	*	4	10.4*	*	*	28.1
TOTAL	55.8	92.2	89.8	121.3	293.8	676.6	130.3	64.2	1523.9
Casual worker -									
Preferred permanent	57.5	47.4	19	7.7	8.5	16.8	4.7*	*	163.4
Preferred casual	58.2	39.9	12.9	5.1	4.3	6.4*	*	*	130.6
Undecided	11.3	4.4*	*	*	*	*	*	*	21.4
TOTAL	127	91.7	33	13.7	14.9	24.2	6.9	4.1	315.4
Total -									
Preferred permanent	105	126.8	99	117.8	280.3	637.9	125.1	57.4	1549.5
Preferred casual	65	49.4	19.4	14.2	22.2	51.3	10.8	8.1	240.4
Undecided	12.8	7.7	4.3*	*	6.2	11.6*	*	*	49.5
TOTAL	182.8	183.8	122.7	135	308.7	700.9	137.1	68.4	1839.4

(a) employees who were permanent or casual workers and usually worked 10 hours or more per week

Source:

ABS (1987)

Labour Statistics, Australia, 1986

Cat. No. 6101.0, Table 8.5, p117

Table 3.8 reveals that around 90 percent of females employed on a permanent basis were estimated to have no desire to change to casual work. The majority of casual workers, however, would prefer to work on a permanent basis. These findings hold for individuals on full- or part-time schedules. Table 3.8 also reveals a relationship between casual workers and the number of hours worked. Around 70 percent of casual workers work between 10 and 29 hours per week. Although the probability of being a permanent part-time worker increases with the number of hours worked, with the exception of the lowest hourly group, the majority of females working part-time are permanent part-time.

Despite the majority of part-time workers being on a permanent basis of employment it is interesting to compare the fringe benefits associated with different work contracts. Table 3.9 provides a comparison of fringe benefits by the number of hours worked. Two features are noteworthy. First, the probability of receiving fringe benefits increases with the number of hours worked. We have already ascertained that a significant majority of part-time workers are classified as permanent part-time where they automatically receive a range of benefits. Also, the institutionally determined benefits to permanent part-time workers are provided on pro-rata basis with full-time workers. Thus, the probability of receiving fringe benefits may increase with hours worked and part-time workers are under-represented in jobs which pay fringe benefits, irrespective of whether the employee works full- of part-time.

The second noteworthy feature of Table 3.9 is that as the number of hours worked per week increases, so does the probability an individual will be entitled to receive sick leave, annual leave and long service leave.

TABLE 3.9 : Female employees receiving fringe benefits by hours of work and type of benefit, Australia, 1986

Benefit type	Hours						TOTAL
	>20	20-29	30-34	35-39	40	41+	
	Percent of employees receiving benefits						
No benefit	0.50	0.26	0.11	0.04	0.04	0.04	0.20
Holiday expenses	0.01	0.02	0.03	0.03	0.02	0.04	0.02
Low interest finance	0.01	0.01	0.32	0.02	0.02	0.02	0.02
Goods and Services	0.14	0.17	0.22	0.19	0.21	0.25	0.19
Housing	0.01	0.01	*	0.01	0.01	0.04	0.01
Electricity	0.01	*	*	*	*	0.03	0.01
Telephone	0.03	0.03	0.02	0.02	0.02	0.06	0.03
Transport	0.02	0.02	0.02	0.01	0.02	0.07	0.03
Medical	0.01	0.02	0.04	0.02	0.03	0.04	0.02
Union dues	*	*	*	0.01	*	0.02	0.01
Club fees	*	*	*	*	*	0.01	0.00
Entertainment	*	*	*	*	*	0.02	0.00
Shares	0.01	0.00	0.00	0.00	0.00	0.00	0.01
Study leave	0.01	0.02	0.02	0.02	0.02	0.02	0.02
Superannuation	0.10	0.17	0.31	0.38	0.27	0.36	0.25
Sick leave	0.33	0.58	0.82	0.92	0.93	0.90	0.71
Annual leave	0.33	0.59	0.83	0.92	0.94	0.90	0.71
Long service leave	0.27	0.47	0.66	0.75	0.71	0.69	0.56
Sample (000s)	600.50	312.20	234.40	482.10	422.00	271.20	2322.40

* sample variance too large for statistical inference

Source : Australian Bureau of Statistics (1986), Employment Benefits Australia, August, Table 7, p12.

3.5 Trade Unions and Part-time Work

Unlike the United States, Australia has a significant degree of workforce unionisation. In the past, it was perceived by some elements of the trade union movement that part-time work would adversely affect full-time employment. Additionally, since part-time work is dominated by females, and as a significant majority of trade union officials were male, the priority of part-time work for females was often overlooked as a result of inadequate representation. However, in 1981 the Australian Council of Trade Unions (ACTU) adopted a Working Woman's Charter, which advocated the introduction of broadly defined flexible working hours, including both part-time employment and job-sharing. The charter consisted of five principles ¹⁰.

First, part-time work should not be created at the expense of full-time jobs. The ACTU argued the first priority of trade unions must be the protection and preservation of full-time employment opportunities. However, the original award provisions for part-time employees were made in times of labour shortage. In the decisions of the respective tribunals, the general theme was that part-time work should be utilised in order to assist in meeting the needs of the industry concerned by providing for the entry into the workforce of persons who were unable to work full-time, particularly married women, thereby expanding the total available workforce ¹¹. However, in *Re Vehicle Industry - repair, service and Retail - Award 1980*, the full bench of the Australian Conciliation and Arbitration Commission supported this objective by temporarily varying the award for nine months to allow for weekly employees, by mutual consent, to be engaged on a part-time basis. The decision was made in response to the general down-turn in the economy as a

¹⁰ Cited in Ford and Plowman (1983), p202

¹¹ See *Re Clerks (state) Award (1953)* 52 AR 199.

means of preventing further retrenchments in the industry. The Australian Commission rejected an application to vary the award in general to allow for permanent part-time employment, expressly maintaining that it was not to be implemented as an alternative to full-time employment

that whereas part-time employment has been extended there has been no significant departure from the original concept that it must be shown to be desirable to meet particular needs of the industry and that it would not be detrimental to full-time employment.

Second, the ACTU argued that part-time work is not and must not be used as a means of reducing unemployment. However, the economic recession occurring in the early eighties reversed this situation, with part-time employment becoming a necessity in some industries as an alternative to retrenchments and for many who wished to enter the workforce on a part-time basis. Despite this, the union movement was keen to identify that part-time work should not be used by employers as a response to an increasing unemployment. An analysis of the relationship between part-time work and the unemployment rate in both Australia and the United States in Chapter 4 examines the relative success of this objective.

Third, the ACTU suggested that any change in work hours should be introduced only after consultation and agreement with unions. Although the ACTU had a significant representation in the full-time labour market, female workers and part-time employees had not been covered by a union to the same extent as male full-time workers. One reason for this was that part-time workers were difficult to organise as the costs involved were higher than for full-time workers.

Fourth, the ACTU chapter suggested that part-time workers should attract pro-rata entitlements. Additionally, they wanted part-time work to

carry a loading for, and be based on, the demands of workers for a more flexible working life. In part, the usual conditions for permanent part-time worker meet the objective of pro-rata payments. In practice, award provisions relating to part-time employment have largely been designed to meet the needs of the industry concerned and to protect the future employment of both full- and part-time employees. In the case of *NSW Clerks Newspaper Award* (1976) 76 AR 839, Justice Dey stated

It seems unfair that proprietors should have to engage and pay as casuals persons who are desirous of accepting regular work on a part-time basis with at least the benefits associated with weekly hiring, when the industry has a demonstrated need for that type of labour.

The decision in this case related to the employment needs of this industry which deserve particular consideration and that it is reasonable to facilitate the entry into that employment of persons who are desirous of accepting it. If there be any suggestion that provisions are being abused and that opportunities for weekly employment are being unfairly restricted, the union is there to protect the position.¹²

This decision has been adopted widely across awards including the *Club Employees (state) Award* case 1981 AILR 433, *Re Gas Meters Makers (State) Conciliation Committee* 1932 AR 341, p346 and *Re Clerks and Switchboard Attendants' Award - State*, Peebles C., 1986 AILR 181(2).

Fifth, the ACTU argued that part-time work should not substitute for a genuine reduction in standard working time. The ACTU has never sought, nor has there been any decision which has related the compositional changes in

¹² 1976 AR 839, 853

the full-and part-time ratio of an industry with general changes in the standard working time specified in an award.

3.6 Advantages of Part-time work for Employers

Aside from the flexibility part-time work gives employees, obviously for the existence and growth of part-time work there must exist some advantages of employing part-time workers for an employer¹³. First, as a result of the business cycle, the demand for a firm's output will vary over time. Part-time work enables employers to minimise costs by more effectively matching labour supply to variations in customer demand or production. Industries which have often been cited as utilising part-time work for these purposes are the hospitality industry and retailing. In industries which are affected by peaks and troughs in demand for their product or service over a more limited time frame (such as a day), part-time work provides a cost effective method of employing labour. Examples of this type of demand are observed in occupations such as banking, retailing and sales.

Second, part-time work enables firms to operate for extended periods of time. An example of this type of practice is evident in hospitals and medical clinics. Retail outlets and hospitality venues offering 24 hour services also use a high proportion of part-time workers.

Third, some occupations involve less than full-time hours, including entertainers, artists, photographers, cleaners and housemaids. Additionally, some occupations by their very nature do not require 35 hours a week. Examples of this type of occupation are pilots, navigators, athletes. Thus, the utilisation of part-time workers provides flexibility for both employers and

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Some of these points have been identified by Lewis (1990).

employees. However, as identified in the previous section, cases do exist where employers have employed individuals on a part-time basis as a result of insufficient demand.

Fourth, the introduction of new technologies has led to a re-organisation of work tasks and the increased use of part-time workers in industries such as retailing, banking and insurance. The use of information and data processing has transformed clerical occupations and in many cases reduced the labour requirements. Outworkers are also being increasingly used for this type of work.

Fifth, in instances where the number of individuals with the necessary specialist skills is limited, and these individuals are unable to work on a full-time schedule, part-time work provides a mutually acceptable outcome. An example of this occurs in higher education, especially trade colleges, where the teachers are usually accomplished tradesmen who can earn more within their trade than in teaching. In order to maintain their teaching standards, many trades colleges in Australia employ most of their teachers on a part-time basis. A similar outcome occurs in universities where most tutors are employed on a part-time basis, allowing these individuals to pursue alternative employment and career opportunities.

Sixth, it is sometimes argued that as a result of the limitations of individuals motivation and attention spans, limiting the number of hours an individual is required to work will increase their productivity.

3.7 Part-time work and unemployment

The growth in part-time cannot be attributed to any single factor but rather a combination of several factors. In 1986, only 4.35 per cent of Australian females working part-time, and 13.7 per cent of males working

part-time actively sought full-time jobs¹⁴. For the United States in 1986, 24.8 per cent of females and 55.1 per cent of males working part-time did so on an involuntary basis¹⁵. For Australia, the high percentage of part-time workers who prefer part-time work (even when offered a full-time job), the number of unemployed persons who are seeking part-time jobs, and the significant reserve of individuals who are not in the labour force but would take one if offered indicates the reservoir of supply for part-time work.

However, the degree to which part-time work is a choice requires careful evaluation. As identified in Table 3.2, for women with children (particularly young children), part-time work is the only means of achieving continuous labour market involvement where child care provision is limited, or there exists social or cultural constraints on working full-time. In 1986, almost one sixth of part-time workers would prefer more hours, and hence may be regarded as underemployed.

Demand side factors which affect part-time employment are driven by the role part-time work has in matching labour supply with production constraints. The Bureau of Labour Market Research ¹⁶ noted that there is insufficient evidence to determine the relative contribution of supply and demand factors to the growth of part-time work, but that labour market participation is highly correlated to opportunities. Married women in particular tend to bypass the unemployment pool and move in and out of the labour force as employment opportunities change. The growth in part-time jobs has attracted a large number of women and students into the labour force

¹⁴ Part-time workers who had actively sought full-time work in the four weeks preceding the Labour Force survey are defined as being involuntary part-time workers.

¹⁵ An analysis of these differences and effects of unemployment upon these estimates is provided in Chapter 4.

¹⁶ BLMR (1985)

and there exists a significant reservoir of workers not in the labour force currently available for part-time work. Although there is no evidence on the attractiveness of part-time work for individuals not in the labour market, Table 3.10 provides some information on the differing demands for work by unemployed workers over time.

TABLE 3.10 : Unemployment rate of persons, whether looking for full- or part-time work, August 1976 to August 1986, Australia
(‘000)

August	Males		Females	
	Looking for full-time	Looking for part-time	Looking for full-time	Looking for part-time
1976	142.7	13.9	94.1	42.0
1977	168.5	21.6	114.8	54.4
1978	207.9	14.3	126.5	49.6
1979	184.0	13.5	131.8	48.1
1980	193.9	15.7	140.7	44.2
1981	187.8	12.7	135.9	44.2
1982	250.4	21.3	137.2	52.5
1983	409.5	20.2	197.9	59.3
1984	359.0	22.5	165.1	57.9
1985	323.3	23.3	160.9	60.1
1986	319.9	28.1	170.8	76.9
Unemployment Rate			(per cent)	
1976	3.7	7.5	6.4	5.7
1977	4.4	10.5	7.5	7.1
1978	5.4	6.4	8.3	6.2
1979	4.7	6.2	8.6	6
1980	4.9	7	8.7	5.1
1981	4.7	5.4	8.3	5
1982	6.2	8.1	8.4	5.8
1983	10.1	7.7	11.7	6.5
1984	8.7	8.4	9.6	6
1985	7.8	8	9.1	5.8
1986	7.6	9.2	9.2	7

Source : ABS (1987), Labour Statistics, Australia, 1986, Cat. No. 6101.0, Table 4.1, p60

For unemployed males, relatively few sought part-time work over the decade to 1986. For unemployed females, the ratio between those seeking full- to part-time work has remained relatively constant over the decade. However, in absolute terms, in 1976 around three times as many unemployed females sought part-time work compared to unemployed males, and by 1986, this ratio had dropped to around 2.7. For unemployed males in 1986, 91 percent sought full-time employment. For unemployed females in 1986, 69 percent sought full-time employment.

3.8 Cross Section Data

To analyse the effects the characteristics of individuals have upon their labour force participation, two cross section data sets will be utilised in this thesis. The Australian data is derived from the 1 per cent tape of the *1986 Population and Housing Survey*. The United States data is derived from a 15 per cent randomly selected sample of the *March 1987 Current Population Survey*. The datasets used in this analysis (for both countries) comprises of females aged 18 to 65 years who were working at the time of the survey. The occupational classifications represented in this paper follow from the International Standard Classification of Occupations.

For United States females who work part-time, aside from some minimum wage legislation, there is no broad-based institutional arrangement which governs wages. Table 3.11 illustrates the differences which occur in the hourly wage ratio for females by occupation in Australia and the United States. Without exception, part-time hourly wages exceeded full-time hourly

wages for Australia in 1986. For the United States, this phenomenon is reversed¹⁷.

Although some insights may be provided into the relative performance of part-time workers in Australia and the United States, caution needs to be

TABLE 3.11 : Female wage ratios *, by occupation, 1986/87

<u>Occupation</u>	<u>Australia</u>	<u>United States</u>
managers and administrators	1.5	0.79
professional	1.22	0.91
para-professionals	1.34	0.85
trades persons	1.57	1.02
clerks	1.35	0.81
sales and personal service workers	1.42	1.04
plant and machine operators	2.05	0.86
labourers and related workers	1.30	0.81
TOTAL	1.31	0.84

* ratio is $(\ln W_{pt} / \ln W_{ft})$

applied to any discussion of the raw wage differentials. Firstly, hourly wages represent only part of the compensation employees receive. If individuals choose part-time work as a result of their preference for a combination of hours and compensation among the available part-time and full-time

¹⁷ The ratio recorded for trades should be viewed with caution due to high standard errors. For sales, although the ratio exceeds one, it should be noted this groups are among the lowest paying occupations for females working full- or part-time.

opportunities, then we may conclude the appropriate benchmark is the observed compensation for full-time workers¹⁸. Holden argues that

if women are prevented in working in those occupations where they face the most favourable full-time opportunities, the full-time wage rates of women in the occupations in which they do work is not an appropriate standard.¹⁹

Secondly, no account for the differences in the characteristics of the individuals has yet been made. It may be that rather than part-time work being "bad" (in terms of lower compensation) in the United States, it may simply be inhabited by poor quality workers who have low productivity, and who are employed in part-time jobs as a result of selection out of full-time jobs. The following chapter estimates the relative importance of individuals' endowments and productivity characteristics in addition to sample selection effects in explaining differences in wages between full- and part-time workers in both countries.

¹⁸ This conclusion is based upon the assumption that both full and part time jobs are equally available to the individual and therefore the outcome of which job to take is a result of choice rather than labour demand constraints in the labour market.

¹⁹ Holden, K.,(1990) p158

CHAPTER FOUR

EMPLOYMENT STATUS IN AUSTRALIA AND THE UNITED STATES

4.1 Introduction

This chapter examines two issues which relate to the employment status of individuals in Australia and the United States. First, an analysis of the relative trends in full- and part-time employment over time for males and females in Australia and the United States is undertaken. Using this data, the role of cyclical factors such as the unemployment rate in determining the part-time employment rate is undertaken.

Second, although time series data allows us to observe trends in part-time employment through time, it does not provide an indication of the relative characteristics of part- to full-time workers. However, the time series evidence does indicate that part-time work is more prevalent for females than males. Therefore, to proceed we focus the analysis on females using cross-sectional data derived from the 1986 Population and Housing Survey of Australia and the 1987 Current Population Survey of the United States¹.

This work is of interest for two reasons. Firstly, we may determine the effect of factors such as education, marital status and number of children on the probability an individual will work in a given employment state. Initially, we estimate a model which analyses these effects for individuals working either full- or part-time. This is known as the dichotomous employment status model. However, this approach ignores females who do not work. Hence, a second model of employment status is

¹ The United States cross section data represents a randomly selected sample of females aged 18-65 years. However, for the Australian data, age is reported as a categorical variable. The sample selected therefore contains females aged from between 15 and 19 years and less than 65.

developed which allows three employment outcome - not working, working part-time and working full-time. This model is known as the trichotomous employment status model. Modelling employment status with three outcomes has the advantage of allowing us to determine the similarities and differences between the effect personal characteristics of females have on the employment status of the adult, working age population.

In cases where individuals are not selected into groups in a random manner, it is necessary to correct for selectivity biases in the earnings equation². The results from both the dichotomous and trichotomous models are utilised to correct for selectivity bias in the context of full- and part-time wage equations in the following chapter.

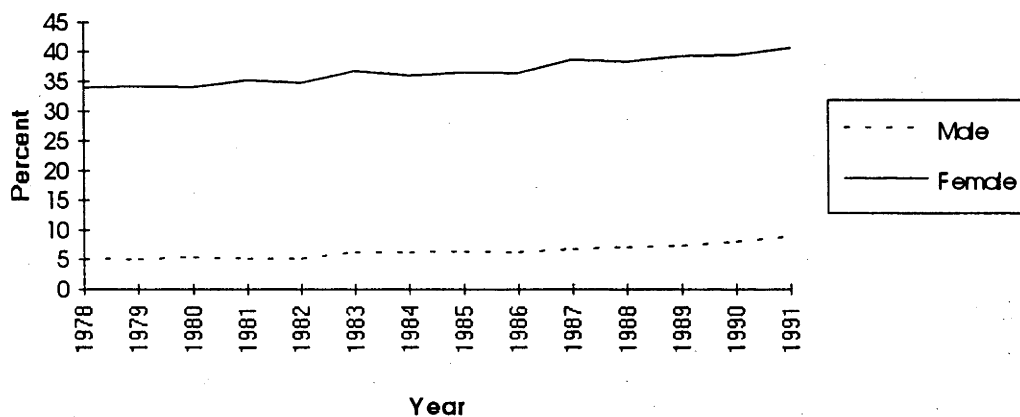
4.2 Trends in full- and part-time employment

In this section, a comparison between the part-time employment trends of males and females in Australia and the United States, as well as a comparison of the employment trends of females between these countries is undertaken. The role of cyclical factors including the unemployment rate on the voluntary and involuntary part-time employment rate is also estimated.

For the years between 1978 and 1992, the employment share of Australian females in part-time work steadily grew from around 34 percent to approximately 40 per cent of females employed in 1992 (figure 4.1). For males, whilst their representation in part-time work is significantly lower, their representation in part-time work has also shown a steady increase between 1978 and 1992 from around 5 per cent to 10 per cent of male employment.

² Heckman, J.J., (1979)

Figure 4.1 : Australian part-time employment trends, by sex; 1978 - 1991

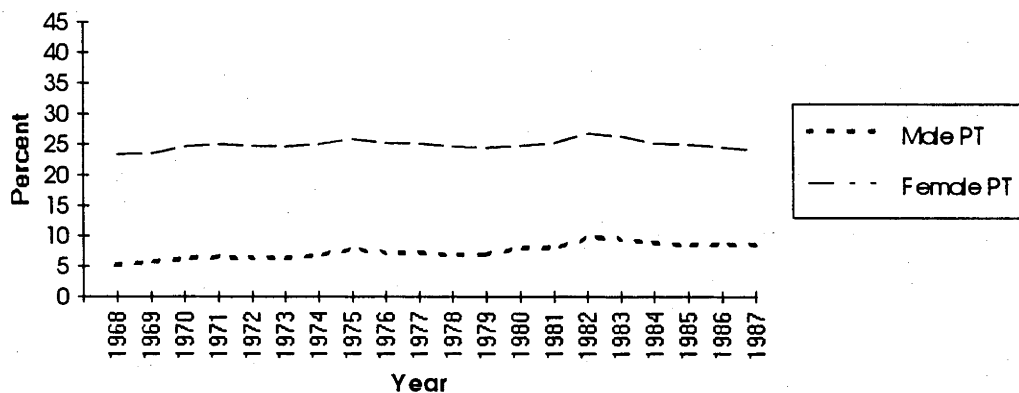


Source :

Australian Bureau of Statistics (various issues), Labour Force, Catalogue No. 6203.0, as derived from the DX data series.

Figure 4.2 illustrates the trends in the part-time employment share for males and females in the United States between 1968 and 1987. Two observations on the relative part-time employment share for males and females between countries are possible. First, unlike Australia, the part-time employment share for females in the United States has remained relatively stable over this time period. Second, the part-time labour market for males has grown steadily over this period (although as for Australia, relative to females, few males work part-time). Third, as for Australia (although not shown) the rate of involuntary part-time employment is higher for males than for females.

Figure 4.2 : United States part-time employment trend, by sex; 1968 -1987



Source :

U.S. Department of Labor, Bureau of Labor Statistics (1988), Labor Force Statistics Derived from the Current Population Survey, 1948-1987, August, Table B-19; and Employment and Earnings (various issues).

It is possible to gain further evidence on the (in)voluntary component of part-time employment in both Australia and the United States³. For the United States in 1986, the majority of female part-time workers (around 80 per cent) worked part-time on a voluntary basis. For the corresponding period in Australia, the rate of voluntary part-time employment is 95 percent of females working part-time workers who had not actively sought full-time work in the preceding four weeks of the Labour Force survey⁴.

In an attempt to understand the relationship between part-time work and cyclical fluctuations in employment, Tables 4.1 and 4.2 show the results of ordinary least squares (OLS) regressions on the responsiveness of

³ Time series data were derived from the Australian Bureau of Statistics Labour Force Survey (various issues) and the Bureau of Labor Statistics, (1989).

⁴ Therefore, involuntary part-time employment refers to individuals currently employed in part-time work who would sought full-time employment. For Australia, involuntary part-time refers to individuals who are currently work part-time (less than 35 hours per week), and have in the previous month actively sought full-time work, as a ratio of all part-time workers. For the United States, involuntary part-time workers were self-identified as working part-time on an involuntary basis.

the part-time employment fraction to changes in the unemployment rate for males and females. As argued by Blank (1990)

[i]f the changes in the percentage of part-time workers are highly correlated with movements in unemployment, this would be evidence that increases in part-time work reflect slack labor market demand and thus are an indication of underemployment⁵.

Table 4.1 :Cyclical fluctuations in Part-time employment, by sex, Australia and the United States

Dependent Variable : Part-time employment rate

Australia, 1978 Q1 to 1991 Q2			United States, 1968-1987 *		
Variable	Male Coeffic.	Female Coeffic.	Variable	Male Coeffic.	Female Coeffic.
time trend	0.065 (20.382)	0.129 (32.402)	time trend	0.116 (8.286)	-0.053 (-4.417)
unemploy rate	0.005 (0.156)	-0.056 (-0.849)	unemploy rate	0.398 (7.804)	0.569 (13.548)
1st quarter	0.098 (0.771)	0.097 (0.557)	constant	3.634 (13.713)	21.746 (99.752)
2nd quarter	0.074 (0.581)	0.0396 (0.226)	R2	0.96	0.93
3rd quarter	0.034 (0.266)	-0.003 (-0.018)	*Based on estimates provided in Blank (1990) ⁶ using annual data.		
constant	4.477 (20.903)	33.670 (56.802)			
Mean Dep	6.65	36.80			
N	54	54			
DW-statistic	0.61	1.20			
F(5, 48)	102.68	214.75			
Adj R2	0.91	0.95			

Data source for Australia derived from ABS (various issues), Labour Force, Cat. No.6203.0 as derived from the DX data service.

After accounting for seasonal fluctuations and the unemployment rate, there exists a significant positive time trend for all groups except

⁵ Blank, R.M.,(1990) p127.

⁶ Blank, R.M.,(1990), p127.

United States females. For this group, the estimates suggest that after holding the unemployment rate constant, the part-time employment rate for females actually decreased over this time period. For both Australian males and females, the unemployment rate does not appear to affect the overall part-time employment rate. The Australian labour market is therefore less likely to use part-time work as a method of rationing employment over the cycle. For the United States, the unemployment rate does appear to have a significant effect on the part-time employment rate of both males and females. For males, a 1 percentage point increase in the unemployment rate increases the percentage of men working part-time by 0.4 percentage points. The comparable estimate for females is 0.6 percentage points.

Table 4.2 presents the results from regressions relating the effect of the same cyclical factors of Table 4.1 upon involuntary part-time employment over time. For Australia, the unemployment rate is not a significant factor in the part-time participation rate for both males and females. However, for those working part-time on an involuntary basis, the unemployment rate is a significant factor. Evidence from the United States also suggests the overall unemployment rate is a significant determinant of involuntary part-time employment for both males and females.

The magnitude of the effects of unemployment is quite different with the United States results indicating that with large changes in the unemployment rate, only relatively small changes in the involuntary component of the part-time employment rate may be anticipated. For Australian males, the effect is large. For Australian females, the effect is less than for their United States counterparts. The interesting point therefore, is that while involuntary part-time employment responds to the unemployment rate in both countries, the same is not true for part-time employment in aggregate. The Australian results indicate that it is the

voluntary component of the part-time employment which is not subject to cyclical fluctuations. Hence, no evidence is found to support the hypothesis that part-time employment is utilised as a rationing mechanism.

Table 4.2 : Cyclical fluctuations in involuntary part-time employment, by sex, Australia and the United States *

Dependent Variable : Involuntary part-time rate⁷

Australia 1978 Q1 to 1991 Q2			United States 1968-1987		
Variable	Males Coeffic.	Female Coeffic.	Variable	Males Coeffic.	Female Coeffic.
time trend	0.036 (3.317)	0.042 (14.264)	time trend	0.075 (4.688)	0.109 (5.737)
unemployment rate	1.224 (11.517)	0.279 (5.655)	unemployment rate	0.341 (58.793)	0.396 (5.910)
1st quarter	-1.279 (-2.959)	0.164 (1.263)	constant	0.005 (1.000)	1.259 (3.567)
2nd quarter	-2.088 (-4.829)	-0.184 (-1.416)	R2	0.91	0.92
3rd quarter	-2.356 (-5.350)	-0.621 (-4.692)	*Based on estimates provided in Blank (1990) ⁸		
constant	4.760 (6.526)	1.125 (2.554)			
Mean Dep	12.70	4.46			
N	54	54			
DW-statistic	1.52	1.23			
F(5, 48)	82.38	52.79			
Adj R2	0.51	0.83			

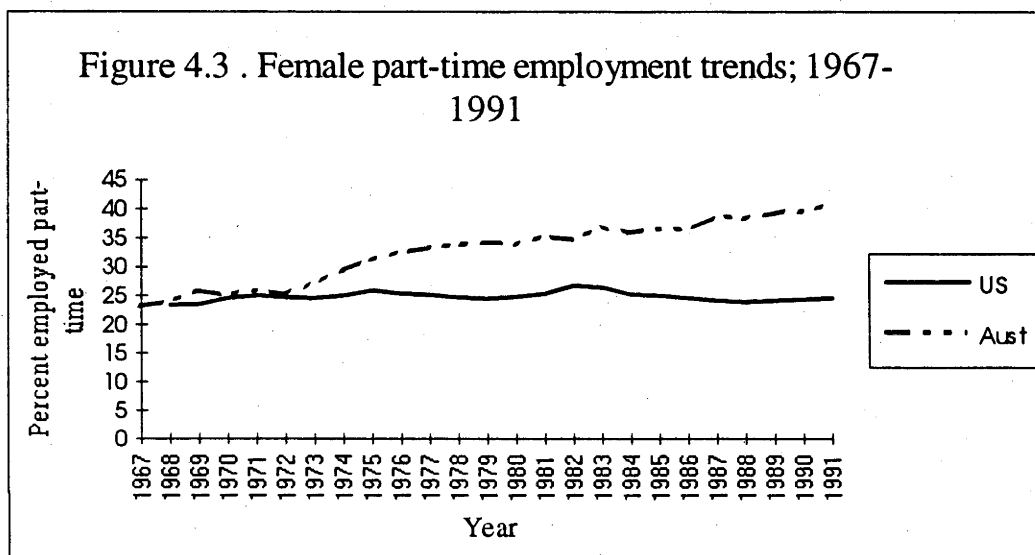
Overall, although the time series evidence does suggest that in the United States part-time work is responsive to cyclical factors and is, to some degree indicative of underemployment this explanation of part-time

⁷ Involuntary part-time rate refers to the number of involuntary part-time workers as a proportion of part-time workforce.

⁸ Blank, R. M.,(1990), p127.

work **does not** apply as clearly for Australia. That is, part-time employment in Australia does not appear to be characterised by underemployment in full-time jobs.

Since the majority of part-time work is undertaken by females in both Australia and the United States, it is useful to compare the relative growth in the employment share of females working part-time in these countries. Figure 4.3 allows us to analyse the trends in the part-time employment share over the last 15 years. As noted in Chapter 1, we may



Sources :

For the United States, U.S. Department of Labor, Bureau of Labor Statistics (1988), Labor Force Statistics Derived from the Current Population Survey, 1948-1987, August, Table B-19; and Employment and Earnings (various issues). For Australia, DX database series derived from the Australian Bureau of Statistics (various issues), Labour Force, Catalogue No. 6301.0.

a. For the United States, represents females working in non-agricultural industries aged 20 years or more. For Australia, represents females working in any industry (except defence or diplomatic appointments) aged 15 years or over. Part-time is defined as those individuals who usually work less than 35 hours per week, and who did so during the survey week. The graph represents the proportion of working females who undertaken part-time work.

observe from the figure that the percentage of women working part-time over this time period as a proportion of total female workers for Australia grew at a higher rate than for United States females between 1967 and 1978. Since 1967, part-time employment of females has steadily increased

from around 25 percent to nearly 40 percent in 1992. This trend compared markedly with the United States experience where although the numbers of part-time females has continued to increase, the proportional representation of part-time workers has remained fairly constant. It is in an attempt to understand the labour markets illustrated in Figure 4.3, particularly a cross section for the years 1986/87, that motivates the following analysis.

4.3 Modelling Employment Status

Most early explanations of part-time work focussed on either supply or demand side explanations⁹. The supply side explanations include a discussion on the inter-relationships between part-time employment growth, changing employment shares of groups (such as married women with dependants, older workers, the youth labour market), and structural change effects (such as the change in the relative importance of the services sector)¹⁰. Demand side explanations focus on factors such as the relative labour costs of full- and part-time workers (including hourly wages and non-wage benefits) and unemployment. The difficulty with these two approaches is that it is not possible to separate the demand and supply-side factors in their influence on an individual's employment status. For example, although most analyses of full- and part-time work begin by following a supply-side participation equation, in undertaking this procedure the role of demand side factors is ignored.

From preceding analyses it appears that whilst unemployment may be an important consideration in an analysis of full- and part-time workers, the role of rationing does not appear to have a consistent bearing on the employment outcomes between countries. This chapter proceeds by

⁹ OECD(1983), (1985) and Owen (1979).

¹⁰ This sector has experienced significant growth in most western countries over the last decade. The implications of both industry and occupational variations are discussed in Chapter 6.

analysing a reduced form employment status model rather than the supply-side participation rate model, since it appears observed outcomes result from both supply and demand factors. The analysis in the remainder of the empirical analysis of this chapter refers to females in Australia and the United States only. Estimations of models relating to male employment status are conducted in Chapter 7.

4.3.1 A dichotomous outcome : full- or part-time work

The existence of two sectors (in this case, full- and part-time work) with different wage setting practices lends itself to dual and human capital theories being incorporated into this analysis. Neoclassical economics emphasises models that are continuous and therefore easily applied to mathematical model development. If however, there exists discontinuities of the form suggested by Piore (1980)¹¹, individuals are assumed to choose the sector of employment that maximises their expected present value of their lifetime utility.

We may model full- and part-time jobs explicitly from within the following framework. Initially, we assume the individual weights up the relative advantages that accrue as a result of a choice between part- and full-time work¹². Individuals are assumed to compare the maximum utility attainable given each work alternative¹³ and select either full- or part-time based upon which alternative yields the maximum utility. Preferences for

¹¹ Piore, M.J.,(1980)

¹² The labour force participation decision should obviously be modelled more appropriately in a life-cycle context especially as has been pointed out (see Ben-Porath (1973)) when there exists heterogeneity across individuals in their propensity to work in each state. Unfortunately, panel data for Australia is only available for the youth labour market.

¹³ Note the underlying assumption that full- and part-time work are both equally available alternatives. That is, this framework does not allow for labour market demand constraints.

working full- or part-time¹⁴ are assumed to follow a well behaved utility function¹⁵.

Let V_{ji} be the maximum utility attainable for individual i upon choosing either part- or full-time work. Assuming this indirect utility function may be decomposed as follows

$$(4.5) \quad V_{ji} = S_{ji} + \epsilon_{ji}$$

where S_{ji} is the non-stochastic component that is a function of observed variables, and ϵ_{ji} is the stochastic component of the utility function which itself is a function of unobserved characteristics.

To determine the employment states more precisely it is possible to simplify the notation such that there exist k states from which the individual may choose. In this case, the choice is between full- or part-time work. There are also j possible outcomes of the work decision. Again the choice is between full- and part-time work. In the section 4.3.3 we extend the possible alternatives for k and j to include individuals not working.

Thus, for the case where the individual is choosing between full- and part-time work only, these choices may be stated as

$$(4.6) \quad I_{ji} = \Pr (V_{ji} > V_{ki} \text{ for } k \neq j, k = \text{ft,pt})$$

Using this result in conjunction with equation 4.5, we may state an individuals choice as

$$(4.7) \quad I_{ji} = \Pr [(S_{ji} - S_{ki}) > (\epsilon_{ki} - \epsilon_{ji}) \text{ for } k \neq j, k=\text{ft,pt}]$$

¹⁴ This specification does not allow for multiple employment states. That is, the individuals participation state is based upon their principal job.

¹⁵ See Varian, H.,(1984) for a discussion of well-behaved utility functions.

Assuming that $S_{ji}=X'\beta$, and the errors are normally distributed, and recalling that V_{ji} is unobserved, the relationship between the observed outcomes and the unobserved indirect utility function is

$$(4.8) \quad \begin{array}{lll} I = 0 & \text{if } V_{ji} < 0 & \text{.. working part-time} \\ I = 1 & \text{if } 0 < V_{ji} < \mu_1 & \text{.. working full-time} \end{array}$$

where μ_1 represent the unknown threshold values of the parameters of the specified model. This specification is referred to as a dichotomous choice model. If we assume the difference of the stochastic components are distributed normally, an appropriate estimation technique is a dichotomous choice probit¹⁶.

4.3.2 Employment status equation results for a dichotomous choice model

As noted previously, the empirical results from this chapter are focussed upon females in the Australian and United States. Since this section estimates the dichotomous choice model, the results from this section refer to Australian and United States females who are working either full- or part-time only. In the following section which utilises the trichotomous choice model, female who are not working are included with the sample of females working full- and part-time.

¹⁶ This specification takes no account of the decision to work and is identical to that adopted by Main (1988) in his analysis of full- and part-time wages for females in the United Kingdom and Simpson (1986) from Canada. The extension of the selection term to include the three choices of not working, working part-time and working full-time is explored in a following section.

TABLE 4.3 : Dichotomous employment status equation of females, Australia and the United States, 1986/87¹⁷

Variable	Australia			United States	
	Coeff	t-ratio		Coeff	t-ratio
constant	1.578	8.676	*	0.436	4.291 *
married	-0.381	-3.527	*	0.238	4.249 *
divorced	0.016	0.105		0.615	8.533 *
race	-0.541	-1.109		0.128	2.237 **
age	-0.018	-4.918	*	-0.002	-0.883
ed2	0.010	0.126		0.015	0.207
ed3	-0.079	-0.891		0.010	0.133
ed4	0.047	0.344		0.073	0.948
kid1	-0.464	-5.241	*	-0.245	-4.904 *
kid2	-0.793	-9.019	*	-0.415	-7.544 *
kid3	-0.842	-6.793	*	-0.599	-7.606 *
kid4	-0.970	-4.023	*	-0.761	-5.017 *
kid5	-0.427	-0.934		-0.698	-2.949 *
murban/city	0.148	1.403		0.143	2.876 *
urban/msa	-0.109	-0.896		0.040	0.942
yinc	-0.008	-2.814	*	-1.6E-05	-3.122 *

Number of obs = 1599

chi2(15) = 241.57

Prob > chi2 = 0.0000

Log Likelihood = -975.88294

Pseudo R2 = 0.1101

Number of obs = 5131

chi2(15) = 221.51

Prob > chi2 = 0.0000

Log Likelihood = -3063.758

Pseudo R2 = 0.0349

Table 4.3 represents the employment status of females who have chosen to work either full- or part-time. The constant represents a single, non-black, unqualified rural dweller who has no dependant children. From Table 4.3 it can be observed that the most important factors that affect a females decision to work full- or part-time is the presence and number of children. In an alternative specification of children for the United States (not reported) the age of the children is also shown to be an important factor affecting the probability¹⁸ of working. This specification is not conducted for Australia, as the Australian data used in this analysis does

¹⁷ Sample means for this specification are provided in Appendix D, Table D1.

¹⁸ This finding supports the results from Teal, F.,(1990) for Australian females.

not contain information on the age of children. However, Teal (1990) has estimated similar equation for Australian females. He finds that the age of dependent children, particularly the very young, does effect a woman's decision to work either full- or part-time.

Table 4.4 : Employment probability of females working full-time¹⁹

	Australia	United States
Pop. Mean (1)	0.56	0.69
<i>Variable</i>	<i>percentage point change (2)</i>	
married	-0.15	0.08
divorced	n.s.	0.19
race	n.s.	0.04
ed2	n.s.	n.s.
ed3	n.s.	n.s.
ed4	n.s.	n.s.
kid1	-0.18	-0.09
kid2	-0.31	-0.15
kid3	-0.32	-0.22
kid4	-0.36	-0.29
kid5	n.s.	-0.27
urban/city	n.s.	0.05
urban/msa	n.s.	n.s.

n.s. - not stated due to insignificant coefficients or sample size of cell too small to form reliable estimates.

(1) This represents the mean of the dependent variable in employment equation.

(2) The -0.15 figure for the married dummy variable in Australia may be interpreted as a decrease of 15 percentage points in the probability a female with the average characteristics of the groups, except she is unmarried, will work full-time after she is married.

Educational qualifications in Australia do not appear to be statistically significant to the decision to work either full- or part-time. This result is also observed for females working full- or part-time in the United States. This is a surprising result particularly for the United States

¹⁹ Represents changes in the cumulative densities of the full-time employment probability as a result of the dummy variable changing from zero to one, when all other variables are estimates at their respective means.

where part-time work is often categorised as being associated with poorly skilled persons. The lack of statistical significance of this and other variables are compared with the estimates from the trichotomous choice equation in the following sections.

Since it is not possible to directly interpret the coefficients of a probit equation, Table 4.4 provides some indication of the relative effect of each significant regressor on the probability to work full-time for a representative individual in each country.

For Australia, being married is estimated to lower the probability a representative individual will work in full-time work by around 15 percentage points. For the United States, being married, increases the probability of a female working full-time by 8 percentage points. Although being divorced in Australia did not effect (in a statistically significant way) the choice of females to work full-time, in the United States being divorced increased the probability of working full-time by 19 percentage points. Being non-white in the United States is associated with a 4 percentage point increase in the probability of working full-time.

Generally, having children is associated with lowering the probability a female works full-time. For Australia, the effect of having the first child on the probability to work full-time for the representative individual is estimated to be around 18 percentage points. For females with four children in Australia, the probability of working full-time is lowered by around 36 percentage points. For the United States, females with one child are estimated to decrease their probability of working full-time by around 9 percentage points. Having five children is estimate to decrease the probability a female works full-time by around 27 percentage points.

Although the dichotomous choice model between full- and part-time work has been utilised in some studies of part-time work (see for example,

Simpson's (1986) analysis of Canadian full- and part-time wages), accounting only for sample selection between workers ignores the sample selection problems addressed in Heckman's original paper. That is, this procedure ignores those individuals who are not working. Hence, statistical inference on the basis of the parameters from the dichotomous model are predicted to be biased as a result of workers not representing a non-random sample of the population. In order to overcome this problem, a trichotomous approach to sample selection is suggested in the following section.

4.3.3 A trichotomous outcome : full- and part-time work and not working

The trichotomous choice model allows for three mutually exclusive employment states. These are not working, working part-time and working full-time. The obvious advantage of dealing with a trichotomous choice model is that it accounts for the employment decisions made by all potential workers. Thus, as in Heckman's two-step case, inferences on an individual's observed/reservation wage is possible. In the next chapter, the observed/reservation wage outcomes implied by the sample selection term not simply for those observed receiving a market wage.

As in the dichotomous choice model, individuals are assumed to estimate their expected utility from each of the three employment states²⁰ and then choose the alternative which maximises their utility²¹. As before, preferences for labour market states are assumed to be described by a well behaved utility function .

²⁰ Note the underlying assumption that part time and full time work are both equally available alternatives. That is, this framework does not allow for labour market demand constraints.

²¹ This specification does not allow for multiple employment states. That is, the individual participation state is based upon their principal job.

Until now we have discussed the utility individuals expect to derive from different workforce states. In the trichotomous choice model these states are not working, working part-time and working full-time. If we assume individuals maximise their utility by choosing between work and leisure. Since individuals choose either work or leisure, an increase in work hour means that the number of leisure hours is reduced. We may model the employment decision individuals face by assuming there exists some latent variable which represents an individual's desired hours of work (D), then we may order the three outcomes. Individuals observed not working are assumed to have a low desire to work. Part-time workers are assumed to have a medium desire to work. Full-time workers are assumed to have a high desire to work.

Although this latent variable is itself unobservable, we may generate an indicator variable (I), which takes different values according to an individual's observed employment status.

$$\begin{array}{llll}
 (4.20) & I = 0 & \text{if } D \leq 0 & \text{.. not working} \\
 & I = 1 & \text{if } 0 < D \leq \mu_1 & \text{.. working part-time} \\
 & I = 2 & \text{if } \mu_1 < D & \text{.. working full-time}
 \end{array}$$

where μ_1 represents the threshold values of the desire to work latent variable D to be estimated. If the latent variable D is a function of various characteristics of the individual that affect potential earnings from full- and part-time work, we may restate this as

$$(4.21) \quad D = \beta * z + \mu$$

where z represents a vector of regressors thought to influence the desire to work and $\mu \sim N(0,1)$.

Estimating equation 4.21 using ordered probit, we may state the cumulative probabilities for each of the three outcomes as

$$(4.22) \quad \begin{aligned} \Pr [I = 0] &= \Phi(-X'\beta) \\ \Pr [I = 1] &= \Phi(\mu_1 - X'\beta) - \Phi(-X'\beta) \\ \Pr [I = 2] &= 1 - \Phi(\mu_1 - X'\beta) \end{aligned}$$

where $\Phi(X'\beta)$ represent the cumulative normal density, and, because probabilities must be positive, $0 < \mu_1$.

This specification provides a useful basis for analysing the marginal effects of the regressors X on the probabilities which unlike ordinary least squares are not equal to the coefficients.

As noted by Greene (1990), if it is assumed that a particular β is positive, this means the marginal effect of a change in the associated exogenous regressor leads to a shift of the predicted probability into the final choice (which in this case is full-time employment). Associated with this change will be a decline in the probability of non-work. It is important to note the effect on part-time work is ambiguous *a priori*.²²

4.3.4 Employment status equation results for trichotomous choice model

This section uses the specification identified in the preceding section to estimate employment status equations for females in Australia and the United States. This section differs from section 4.3.2 in that the employment outcome choices are not working, working part-time and working full-time. The estimation technique utilised for these estimations is ordered probit.

²² See Greene,(1990) p704 for an expansion of this argument.

The estimations reported in Tables 4.5 and 4.6 use this indicator variable as the dependent variable. Thus, for the females in the Australian and United States samples, the dependent variable employment status, takes the value (0) when she is not working, (1) when she works part-time and (2) when she works full-time.

TABLE 4.5 : Maximum likelihood estimates trichotomous employment status, females, Australia

Variable	Coefficient.	T-ratio	Mean of X
ONE	1.054	8.931 *	1
MARRIED	-0.161	-2.305 **	0.7558
DIVORCE	-0.022	-0.237	0.11631
RACE	-0.740	-3.185 *	1.07E-02
AGEYRS	-0.028	-12.78 *	39.22
ED2	0.230	4.733 *	0.3501
ED3	0.417	7.122 *	0.18349
ED4	0.356	3.656 *	4.68E-02
KID1	-0.375	-6.685 *	0.20391
KID2	-0.452	-7.84 *	0.22137
KID3	-0.615	-7.798 *	9.74E-02
KID4	-0.746	-5.293 *	2.72E-02
KID5	-0.800	-3.296 *	7.69E-03
MURBAN	0.029	0.44	0.66144
URBAN	-0.136	-1.767 ***	0.219
YINC	0.010	5.892 *	19.675
MU(1)	0.625	29.214 *	0

*Significant at 1%; **significant at 5%;*** significant at 10%

Log-Likelihood..... -3172.7

Restricted (Slopes=0) Log-L. -3434.0

Chi-Squared (15)..... 522.53

Significance Level..... 0.32173E-13

Parameter estimates of an ordered probit model are difficult to interpret directly. However, a positive coefficient indicates that the effect of a change in the regressor decreases the probability of not working. The probability of working full-time will increase with a change in a regressor which has a positive coefficient. The effect of a change in a regressor on the probability of working part-time when the coefficient is positive may be positive or negative.

To interpret the results of Tables 4.5 and 4.7, Tables 4.6 and 4.8 are provided. In Tables 4.6 and 4.8, reports the percentage point change in the probability that a female with the average characteristics of the population doesn't work, works part-time or works full-time as a result of changing from not having a given attribute, to having that attribute. For example, for Australia, the probability that an average woman does not work is estimated to increase by 6 percentage points as a result of marriage.

TABLE 4.6 : Changes in cumulative densities for dummy variables in the trichotomous employment status equation, females, Australia (1)

Variable	Change (percentage points)		
	Prob[y=0]	Prob[y=1]	Prob[y=2]
MARRIED	0.06	-0.01	-0.05
DIVORCE	n.s.	n.s.	n.s.
RACE	0.26	-0.26	-0.01
ED2	-0.09	0.02	0.07
ED3	-0.17	0.02	0.14
ED4	-0.14	0.02	0.12
KID1	0.14	-0.03	-0.11
KID2	0.18	-0.05	-0.13
KID3	0.23	-0.08	-0.16
KID4	0.27	-0.10	-0.17
KID5	0.28	-0.10	-0.18

n.s. represents that the variable is found not to be statistically significant in regression equation (1) represents the change between the estimated probabilities when the regressors are evaluated at zero and one

For Australia, having some form of educational qualification (ed2 for high school, ed3 for post-school, and ed4 for tertiary qualifications) lower the probability an individual will not work. Females with post-school qualifications are 14 percentage points more likely to work full-time than the average female. All educational qualifications are predicted to increase the probability a female works part-time by around 2 percentage

points. Thus, unlike the dichotomous specification of the employment status equation, education is predicted to influence the work status of females in Australia in a statistically significant manner.

The number of children is predicted to have both a statistically significant effect which is relatively large, on the workforce status of females. As the number of children increases, so does the magnitude of the effect. Thus, as the number of children increases, the probability of not working increases, whilst the probability of working part- or full-time decreases. The magnitude of the effect of five children is to decrease the probability of working full-time by 18 percentage points. Consistent with the principle that part-time work is a mechanism for females to continue working whilst undertaking child-rearing responsibilities is the finding that the magnitudes of the effect of children on the probability of a female working part-time is smaller than for females working full-time.

For the United States, the results Table 4.8 provide a means of interpreting the results from the ordered probit estimates from Table 4.7. As is found in the Australian results, educational qualifications are statistically significant determinants of the employment status of females. Again, this result differs from that reported when the dichotomous model is used. For the United States, the magnitude of the change in the probability of not working, working part-time and working full-time as a result of a change in the education dummy variables is much larger than for Australia. Tertiary qualified females with average characteristics are estimated to be 36 percentage points more likely to work full-time. Unlike Australia, females with some form of educational qualification are less likely to work part-time in the United States by between 2 and 6 percentage points.

TABLE 4.7 : Maximum Likelihood Estimates
Trichotomous employment status, females, United States

Variable	Coefficient	t-ratio	Mean of X
ONE	0.196	2.677 *	1
MARRIED	0.179	4.066 *	0.630
DIVORCE	0.517	9.623 *	0.170
RACE	-0.016	-0.393	0.143
AGE	-0.011	-8.160 *	38.437
ED2	0.590	13.181 *	0.455
ED3	0.758	14.457 *	0.188
ED4	0.963	18.896 *	0.224
KID1	-0.228	-5.806 *	0.213
KID2	-0.403	-9.442 *	0.180
KID3	-0.530	-8.689 *	6.80E-02
KID4	-0.792	-7.115 *	1.99E-02
KID5	-0.891	-5.527 *	8.70E-03
CITY	-0.060	-1.618 ***	0.246
MSA	-0.032	-0.975	0.337
YINC	-0.049	-28.546 *	1.705
MU(1)	0.468	37.819 *	

*Significant at 1%; **significant at 5%;*** significant at 10%

Log-Likelihood..... -6916.8

Restricted (Slopes=0) Log-L. -7340.0

Chi-Squared (15)..... 846.55

Significance Level..... 0.32173E-13

As for Australia and the dichotomous results, having children increases the probability that females in the United States will not work. The first three children are predicted to increase the probability a female works part-time by around 1 percentage point, but further children decrease this probability by around 3 or 4 percentage points. The presence of children lowers the probability a female in the United States will work full-time. As the number of children increases, so does the magnitude of the effect they have upon the probability of working full-time.

Although we may compare the significance of each of the trichotomous employment equations compared to the case where all the parameters are constrained to zero, (see the regression statistics at the bottom of each regression equation), it is not possible to undertake a test

TABLE 4.8 : Changes in cumulative densities of dummy variables for trichotomous employment status equations, United States (1)

Variable	Change (percentage points)		
	Prob(y=0)	Prob(y=1)	Prob(y=2)
MARRIED	-0.07	0.00	0.07
DIVORCED	-0.18	-0.02	0.20
RACE	n.s.	n.s.	n.s.
ED2	-0.21	-0.02	0.23
ED3	-0.25	-0.05	0.29
ED4	-0.30	-0.06	0.36
KID1	0.09	-0.00	-0.09
KID2	0.15	0.01	-0.16
KID3	0.21	0.01	-0.20
KID4	0.31	-0.03	-0.28
KID5	0.34	-0.04	-0.30

n.s. represents that the variable is found not to be statistically significant in regression equation (1) represents the change between the estimated probabilities when the regressors are evaluated at zero and one

which equivalent to an F-test for linear regressions, in order to determine whether the trichotomous or dichotomous models is preferred²³. However, the increased number of statistically significant parameters, the acknowledgment of a third feasible alternative and results which concur with our *a priori* expectations, leads to an empirically based preference for the trichotomous specification.

4.4 Conclusions

This chapter has attempted to demonstrate three points. Firstly, for both Australian males and females, the unemployment rate does not appear to affect the overall part-time employment rate. The Australian labour market is therefore less likely to use part-time work as a method of rationing employment over the business cycle. For the United States, the

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This is because the dichotomous choice model does not represent a restriction on the trichotomous model.

unemployment rate does appear to have a significant effect on the part-time employment rate of both males and females. For males, a 1 percentage point increase in the unemployment rate increases the percentage of men working part-time by 0.4 percentage points. The comparable estimate for females is 0.6 percentage points. For those working part-time on an involuntary basis in both countries, the unemployment rate is a significant factor in involuntary part-time employment.

The United States results indicate large changes in the unemployment rate will only have small effects on the involuntary component of the part-time employment. For Australian males, any change in the unemployment rate would be expected to be more than equalled by changes in the involuntary component of the part-time employment rate. However, the magnitude of this effect in terms of the actual number of employees is small.

Secondly, two models of employment status are estimated. These models are estimated for females only since this group represents majority of part-time workers in Australia and the United States. The first model involved a dichotomous choice. Females are assumed to choose between full- and part-time work only. The second model, a trichotomous choice model allowed females work choose between not working, working part-time and working full-time.

Using the results from each of these specifications we are able to determine the most significant factors that appear to affect the employment status of females in full- and part-time work for Australia and the United States. Interestingly, for both countries family responsibilities are consistently influential on an individual's decision to work part-time. Some of the explanations for family responsibilities increasing a woman's probability to work part-time may include access to child care, the relative earnings of part-time to full-time workers, and the types of jobs Australian

part-time workers undertake relative to the United States part-time workers²⁴.

In the following chapter, the relative wages of females working full- and part-time in Australia and the United States are analysed. The results from the dichotomous and trichotomous models are incorporated into separate analyses of the wage equations for females working full- and part-time in order to correct for sample selection bias.

²⁴ An analysis of the wage effects of the types of jobs part-time workers in Australia and the United States undertaken is provided in Chapter 6.

CHAPTER FIVE

RELATIVE RETURNS TO FULL- AND PART-TIME WORK

5.1 Introduction

In 1986, the wages paid to females working part-time in Australia are approximately 20 per cent **higher** per hour than the female full-time hourly wage. For the United States, females working part-time received wages 20 to 30 per cent **lower** per hour than full-time workers. The aim of this chapter is to utilise an augmented human capital model to investigate how well it explains the female wage differential between full- and part-time work for Australia and the United States in 1986/87.

In investigating the wage differential which exists between females working full- and part-time in Australian and the United States, it is interesting to analyse whether the part-time/full-time "differences" are the result of the average characteristics of individuals, or do the wage differences result from the occupations associated with each sector. This and the following chapter are devoted to analysing potential explanations of relative part-time wages within a human capital framework.

5.2 Full- and part-time wages of females in Australia and the United States

If part-time work is considered as a wage regressor, it is typically accounted for by using a dummy variable which acts as a shift parameter in the wage equation. This specification can be stated as

$$(5.1) \quad \ln(w) = X'\beta + \alpha PT + \epsilon$$

where $\ln(w)$ represents the log of hourly wages, X is the vector of human capital and demographic characteristics thought to affect wages

exogenously, PT is a dichotomous dummy variable which distinguishes full- and part-time workers, and ϵ is a random error.

Table 5.1 reports the findings from fitting equation 5.1 to sample data derived from the Australian 1986 Population and Housing Survey and the United States 1987 Current Population Survey. The dependent variable is the log of the hourly wage¹ for all employed males and females. All traditional human capital and demographic variables are included in this specification². The constant for both countries represents an individual who is single and has not graduated from high school, lives in a rural area, is employed in the private sector in a managerial/administrative job. The part-time dummy (pt) is significant and positive for Australian females, whilst negative and significant for the United States³. The results indicate that after accounting for human capital attributes, a 35 percent wage premium is associated with males working part-time, and a 20 percent wage premium is associated with females working part-time in Australia. For the United States, it is estimated there exists a wage penalty for working part-time of approximately 17 percent for males and 18 per cent for females.

There are, however, at least two difficulties with the specification as detailed in Table 5.1. Without interacting the part-time dummy variable with all explanators, it is impossible to determine the magnitude of the return to part-time employment compared to full-time employment for each of the exogenous variables. Additionally, no account has been made of sample selection which may occur in the choice of working full- or part-time. Thus, it is desirable to develop an alternative specification.

¹ For Australia, the data reports earnings rather than wages. Hourly wage estimates are found by dividing these estimates by the number of hours usually worked.

² See appendix A for variable definitions.

³ The United States results are consistent with those reported in Blank, R.M.,(1990).

TABLE 5.1 : Wage equations, by sex, Australia and United States

Dep. Var. = lnw_{hr}

Variable	Australia				United States			
	Males		Females		Males		Females	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
urban /city	0.200	7.808 *	0.114	3.396 *	0.090	3.809 *	0.115	3.827 *
urban/msa	0.171	5.846 *	0.049	1.260	0.205	10.087 *	0.174	6.695 *
ed2	0.044	2.044 **	0.043	1.694 ***	0.284	8.959 *	0.207	4.477 *
ed3	0.160	7.371 *	0.127	4.212 *	0.403	10.986 *	0.315	6.083 *
ed4	0.260	6.910 *	0.237	4.764 *	0.587	15.551 *	0.551	10.191 *
pt	0.352	14.100 *	0.205	9.139 *	-0.173	-5.220 *	-0.188	-6.854 *
exp	0.032	11.594 *	0.017	4.742 *	0.043	14.644 *	0.027	7.240 *
exp2	-5.70E-04	-1.08E+01 *	-3.00E-04	-3.94E+00 *	-6.88E-04	-1.14E+01 *	-4.64E-04	-5.968 *
race	-0.011	-0.115	-0.135	-1.089	-0.092	-3.234 *	-0.035	-1.042
occ2	0.068	1.753 ***	0.054	0.870	-0.081	-2.253 **	-0.037	-0.773
occ3	0.034	0.814	0.045	0.695	-0.080	-2.351 *	-0.217	-4.669 *
occ4	-0.156	-4.845 *	-0.307	-4.241 *	-0.164	-3.731 *	-0.180	-4.326 *
occ5	-0.064	-1.643 ***	-0.073	-1.386	-0.367	-9.166 *	-0.431	-9.033 *
occ6	-0.182	-4.682 *	-0.235	-4.208 *	-0.371	-9.788 *	-0.571	-7.238 *
occ7	-0.108	-3.014 *	-0.145	-1.980 **	-0.064	-1.968 **	-0.062	-0.733
occ8	-0.238	-7.138 *	-0.273	-4.856 *	-0.130	-3.672 *	-0.249	-4.549 *
govt	0.131	7.102 *	0.105	4.136 *	0.073	2.781 *	0.090	2.863 *
married	0.124	5.345 *	0.027	0.899	0.231	8.859 *	0.016	0.480
divorced	0.115	3.127 *	0.196	4.636 *	0.160	4.271 *	0.037	0.915
_cons	1.589	35.615 *	1.710	25.951 *	1.265	24.702 *	1.377	19.609 *

Number of obs = 2852
 F(19, 2832) = 69.41
 Prob > F = 0.0000
 R-square = 0.3177
 Adj R-square = 0.3131

Number of obs = 2153
 F(19, 2133) = 28.21
 Prob > F = 0.0000
 R-square = 0.2008
 Adj R-square = 0.1937

Number of obs = 5203
 F(19, 5183) = 109.62
 Prob > F = 0.0000
 R-square = 0.2867
 Adj R-square = 0.2840

Number of obs = 4683
 F(19, 4663) = 43.84
 Prob > F = 0.0000
 R-square = 0.1516
 Adj R-square = 0.1481

* significant at 1%; ** significant at 5%; *** significant at 10%

5.3 An alternative specification for a full- and part-time model

To proceed in the modelling of full- and part-time wages, it is useful to recall the model from chapter 4, which implies that individuals compare the maximum utility attainable given each employment alternative⁴, and then selects the alternative which yields the maximum utility. Individuals who choose to work select from two inter-related regimes - hours and wages. The switching regression model⁵ is particularly useful in modelling the wage determination process using two different sets of parameters whereby the wage an individual receives is a function not only of demographic, human capital and other individual specific variables but also of the hours worked per week⁶. As found in the preceding section, the model may be specified as follows⁷

$$(5.2) \quad \ln(w_{ft,i}) = X_i' \alpha + \varepsilon_{1i} \quad \text{if } H_i > H^*$$

$$(5.3) \quad \ln(w_{pt,i}) = X_i' \delta + \varepsilon_{2i} \quad \text{if } 0 < H_i < H^*$$

where for individual i , X represents a vector of regressors thought to influence wages, Y is a vector of variables which are thought to affect the value of non-market time, α , δ are parameters and ε_{1i} and ε_{2i} are errors.

The error structure of this system is assumed to be

$$(5.4) \quad \begin{pmatrix} \varepsilon_{1i} \\ \varepsilon_{2i} \end{pmatrix} \sim \begin{pmatrix} 0 \\ 0 \end{pmatrix} \begin{pmatrix} \sigma_{ftft} & \sigma_{ftpt} \\ \sigma_{ptft} & \sigma_{ptpt} \end{pmatrix}$$

⁴ Note the underlying assumption that full- and part-time work are both equally available alternatives. That is, this framework does not allow for labour market demand constraints.

⁵ For more information on switch regression models see Greene (1990) or Maddala (1984).

⁶ The following is a standard discussion of the wage specification which may be found in Hotchkiss (1991), Simpson (1986).

⁷ The same result (although differences will occur in the residuals) could have been specified as one equation with interactive dummies on each of the regressors. Although equivalent, this approach offers more convenient interpretation.

where the covariance between the two equation is assumed to be estimable by ordinary least squares.

At this point it is important to address the issue of what is the actual threshold values of full- and part-time work? The value traditionally chosen for full-time work is $H_i > 35$, and for part-time work $0 < H_i < 35$. This dichotomy is chosen for two primary reasons : (1) legislative and hence employer perceptions of part-time hours have been defined in this way; and (2) since this is a two-country analysis it is important to remain consistent across the two countries⁸. This approach of using predetermined threshold points is known as applying an exogenous switching rule ⁹.

The identification of the hours classification between full- and part-time work imply

$$(5.5) \quad W_{ft} \text{ when } I = 1 \text{ (that is, } H_i > H^* \text{) and}$$

$$(5.6) \quad W_{pt} \text{ when } I = 0 \text{ (if } 0 < H^* < H_i \text{)}$$

where W_{ft} and W_{pt} represent wages for full- and part-time workers respectively, and I is the index function defined previously. This simultaneity may be shown to induce biases in the specification of the traditional wage function for separate full- and part-time wage equations.

From the development of the index approach to the employment outcomes identified in Chapter 4, the expectations of the wage equations¹⁰ become

$$(5.8) \quad E [\ln w_{ft} | y = 1] = X'\alpha + E[\varepsilon | v > Z'\pi]$$

⁸ Hotchkiss (1991) applies a switching model for various groups when the threshold values of H_i are unknown. For the US, the H^* for males and females was estimated at 38 hours.

⁹ Exogenous switching has been used in several labour economics contexts. See Simpson (1985), Robinson and Tomes (1984), Hotchkiss (1991) and Lee (1978).

¹⁰ This specification is for the dichotomous choice model. The trichotomous model is discussed further in this chapter.

$$= X'\alpha + (\sigma_{\varepsilon v} / \sigma_v)\lambda$$

where $\sigma_{\varepsilon v}$ is the covariance between the errors in the wage equation and selection equation, σ_v is the variance of the errors in the selection equation, and λ represents the inverse Mills ratio ¹¹. The corresponding expression for part-time wages is

$$(5.9) \quad E[\ln w_{pt} | y = 0] = X'\delta + E[\varepsilon | v > Z'\pi] \\ = X'\delta + (\sigma_{\varepsilon v} / \sigma_v)\lambda$$

From the above specification it is apparent that by using the sample selection technique of capturing the inverse Mills ratio and adding it to the regressors in the respective wage equations, the source of potential bias may be removed.

Thus, the respective wage equations may be respecified as

$$(5.10) \quad \ln(w_{ft}) = X_{1i}'\alpha + \rho_1\lambda_{1i} + \varepsilon_{1i}$$

$$(5.11) \quad \ln(w_{pt}) = X_{2i}'\delta + \rho_2\lambda_{2i} + \varepsilon_{2i}$$

As is pointed out by Heckman (1979), if the actual values of λ for each individual are known, then the above equations could be efficiently estimated using ordinary least squares. However, as we do not know the actual values of λ the OLS estimates of α , δ and ρ are unbiased but are inefficient. The derivation of the corrected variance-covariance matrix when sample selection is important may be found in Appendix C.

¹¹ See Maddala (1983), Heckman (1979) for a discussion and derivation of the inverse mills ratio.

5. 4 Results

5.4.1 Wage Equation for Full- and Part-time workers in dichotomous choice

Based upon the specification detailed in the earlier section, estimates of both selectivity adjusted and unadjusted wage equations for both countries are provided in Tables 5.2 and 5.3.

Human capital theory suggests that the coefficient on the education dummies should increase as the level of education increases (indicating increasing returns to education). This expectation is supported for both groups. For the United States the magnitude of the returns to similarly defined education variables are much higher than Australia.

Considering the non-selectivity adjusted results first, the results for Australia reveal similar returns in the full- and part-time results for individuals with high school and post school qualifications. Tertiary qualified females in Australia are found to have higher returns to part-time work than to full-time work (39 percent compared to 15 percent). The experience coefficients indicate that full-time returns are double the returns to experience for part-time workers.

In discussing the dichotomous selectivity adjusted results two results are apparent. Firstly, in the part-time market where the sample selection term is found not to be significant, with the exception of the area dummies, the magnitude and sign of the coefficients do not change significantly from the unadjusted equation. Although the magnitude of the area dummies does change between the adjusted and unadjusted equations, the coefficient remains insignificant. Secondly, sample selection is found to be significant for the full-time wage equation. The implications of this finding for the education parameters is that post school qualified individuals have wages 14 percent higher, and tertiary qualified individuals have wages 27 percent

**TABLE 5.2 : Full-and Part time female wage equations;
Dichotomous choice, Australia, 1986**

Variable	Part-Time		Full-time	
	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)
murban	0.034 (0.580)	0.062 (1.003)	0.165 (4.302)	0.137 (3.169)
urban	0.021 (0.323)	0.074 (1.050)	0.066 (1.473)	0.059 (1.149)
ed2	0.047 (1.026)	0.042 (0.870)	0.035 (1.229)	0.022 (0.666)
ed3	0.117 (2.098)	0.128 (2.187)	0.122 (3.656)	0.142 (3.682)
ed4	0.387 (3.822)	0.370 (3.509)	0.154 (2.979)	0.271 (4.229)
exp	0.011 (1.498)	0.014 (1.686)	0.023 (6.053)	0.029 (6.233)
exp2	-0.0001 (-0.726)	-0.00017 (-1.056)	-0.00048 (-5.663)	-0.001 (-5.653)
abor	-0.278 (-1.211)	-0.191 (-0.701)	-0.012 (-0.089)	-0.071 (-0.388)
occ2	-0.112 (-0.867)	-0.086 (-0.644)	0.158 (2.432)	0.124 (1.654)
occ3	-0.020 (-0.143)	0.013 (0.092)	0.078 (1.199)	0.143 (1.942)
occ4	-0.263 (-1.725)	-0.247 (-1.609)	-0.331 (-4.481)	-0.292 (-3.618)
occ5	-0.205 (-1.735)	-0.165 (-1.379)	-0.023 (-0.439)	0.018 (0.315)
occ6	-0.322 (-2.673)	-0.307 (-2.502)	-0.217 (-3.802)	-0.197 (-3.118)
occ7	0.026 (0.155)	-0.032 (-0.185)	-0.186 (-2.600)	-0.127 (-1.676)
occ8	-0.416 (-3.443)	-0.384 (-3.140)	-0.187 (-3.224)	-0.125 (-1.977)
govt	0.017 (0.332)	0.017 (0.324)	0.135 (5.132)	0.128 (4.366)
married	0.071 (1.052)	0.147 (1.860)	0.023 (0.749)	0.092 (2.331)
divorced	0.441 (4.798)	0.498 (4.694)	0.103 (2.418)	0.089 (1.588)
lamda	n.a.	-0.090 (-1.023)	n.a.	-0.234 (-3.806)
_cons	2.056 (14.653)	1.826 (9.839)	1.616 (23.456)	1.634 (20.642)
Mean Dep.	2.162	2.153315	1.996653	1.974892
F	9.100	8.17	24.6	20.4583
Adj R2	0.143	0.15215	0.2497	0.27473
N	876	760	1277	977

() represent t-statistics with adjusted standard errors
n.a. means not estimated

TABLE 5.3 : Female Full- and Part Time wage equations; United States

Variable	Part-Time		Full-time	
	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)	Coefficient (t-stat)
city	0.0110 (0.138)	0.0233 (0.283)	0.1478 (4.736)	0.1163 (3.389)
msa	0.0779 (1.194)	0.0793 (1.223)	0.1978 (7.156)	0.1874 (6.444)
ed2	0.0740 (0.644)	0.0796 (0.695)	0.2601 (5.303)	0.2500 (4.879)
ed3	0.1388 (1.082)	0.1427 (1.118)	0.3846 (6.956)	0.3732 (6.475)
ed4	0.3864 (2.885)	0.3982 (2.952)	0.6215 (10.781)	0.5934 (9.826)
exp	0.0031 (0.324)	0.0021 (0.223)	0.0332 (8.345)	0.0358 (8.778)
exp2	-0.00008 (-0.410)	-4.9E-05 (-0.245)	-0.00057 (-6.738)	-0.00064 (-7.325)
race	-0.0033 (-0.036)	0.0057 (0.062)	-0.0383 (-1.099)	-0.0551 (-1.492)
occ2	0.1722 (1.083)	0.1715 (1.087)	-0.0678 (-1.420)	-0.0604 (-1.269)
occ3	-0.0477 (-0.314)	-0.0449 (-0.297)	-0.2087 (-4.398)	-0.2049 (-4.332)
occ4	0.3097 (0.712)	0.3201 (0.741)	-0.0909 (-1.154)	-0.0833 (-1.062)
occ5	-0.1062 (-0.707)	-0.1045 (-0.701)	-0.1697 (-4.172)	-0.1643 (-4.048)
occ6	-0.1422 (-0.946)	-0.1392 (-0.933)	-0.5546 (-10.97)	-0.5457 (-10.82)
occ7	-0.1321 (-0.679)	-0.1318 (-0.683)	-0.2541 (-4.788)	-0.2453 (-4.636)
occ8	-0.4291 (-2.061)	-0.4270 (-2.067)	-0.5880 (-6.767)	-0.5761 (-6.654)
govt	0.1556 (1.923)	0.1544 (1.922)	0.0585 (1.759)	0.0625 (1.885)
married	0.2021 (2.094)	0.2072 (2.151)	-0.0122 (-0.365)	-0.0331 (-0.931)
divorce	0.3547 (2.809)	0.3938 (2.708)	-0.0258 (-0.632)	-0.1152 (-2.217)
lambda	n.a.	0.1119 (0.531)	n.a.	-0.3859 (-3.019)
constant	1.2688 (6.486)	1.3742 (4.946)	1.2896 (17.414)	1.5180 (14.098)
Mean Dep.	1.59	1.59	1.89	1.89
F	4.71	4.47	42.18	40.59
Adj R2	0.05	0.05	0.19	0.19
N	1237	1237	3170	3170

() represent t-statistics with adjusted standard errors
n.a. represent not estimated

higher than unqualified individuals, all other things remaining constant. Thus, adjusting for sample selection increases the parameter estimate of tertiary qualified individuals by around 12 percentage points. A positive coefficient on experience and a negative coefficient on experience squared is found for both equations. This result is consistent with the *a priori* expectations of individuals life time earnings¹². However, it is important to recall that the experience term in the wage equations for full- and part-time workers represent the Mincer proxy of (age-years of schooling-6). Thus since, part-time workers could be expected to gain workforce experience at a lower rate than full-time workers, the estimate for part-time workers would be expected to be upwardly biased¹³. However, the results indicate that the effect of adjusting for sample selection on the experience parameter is not significant, however, the magnitude for the experience squared term increased from -0.00048 to -0.001. For married females in Australia, sample selection changed the insignificant parameter of 0.749 to a significant parameter of 0.092. This effect may reflect a strong correlation between the married dummy and lambda.

The United States also has two significant feature which distinguish the estimates in Table 5.3. Firstly, as for Australia, the sample selection term in the part-time equation is found to be insignificant, but significant for the full-time equation. Secondly, unlike Australia, the estimates for the education variables in both the adjusted and unadjusted equations are larger for the full-time equations than the part-time equations. Also, the returns to experience in the United States full-time equation exceed the returns to experience in the part-time equation. As for Australia, a marital status dummy changes sign between the unadjusted and adjusted equations in the

¹² Mincer (1974).

¹³ In order to estimate the sensitivity of these results to different approximations of experience, Appendices E and F provide estimates of full- and part-time wage equations when an alternative measure of experience is adopted.

full-time market. However, in the United States' case it is divorce which changes from an insignificant parameter of -0.0258 to a significant parameter of -0.1152. The interpretation of this change is the same as applied to Australia.

Using the selectivity adjusted equations it is evident that married and divorced females do have significantly different hourly earnings to single females - indicating to some degree the differences in age cohorts between single and other females. For the United States, selectivity again plays an important role in the marital status variables, with the most interesting result being that full-time United States female divorcees earn significantly less than their single counterparts whilst part-time divorcees earn more. Two possible explanations are suggested for this results. Firstly, whilst female divorcees are seen as less desirable workers in the full-time market and their offered wage is in the lower tail of the wage offer distribution, in the part-time market they are desirable workers and their offered wage is in the right tail of the offer distribution.

Discrimination literature in labour economics predicts that race dummies will demonstrate a negative coefficient for non-white individuals in Western developed economies such as Australia and the United States. For Australian females in either full- or part-time employment, Aboriginality is associated with a negative coefficient but it is not a statistically significant factor in the determination of hourly wage rates. This does not indicate that discrimination does not occur against Aboriginals in the Australian labour market, but rather that there exists no systematic, statistically significant discrimination with respect to hourly wages for Aboriginals in this sample. For the United States, an interesting dichotomy between full- and part-time individuals arises with respect to race. For American non-whites working full-time, their racial status is seen

to have a significant negative effect in the order of 4 to 6 per cent on hourly wages. For part-time workers, no significant effect due to race is evident.

Using the insights described in Borjas and Bronas (1989) and Reimers (1983) we may draw some insights into the population characteristics of each labour force state from the sample selection term¹⁴. The type of selection is determined by the sign on the coefficient of the lambda term. Since the selectivity variable in the full-time equation (λ_{ft}) is positive, this result indicates that there is negative self-selection into full-time work for both countries. For part-time work, it would appear that there is not any significant sample selection effect. It is perhaps most interesting to interpret these findings in the context of offered wages¹⁵.

Since sample selection is not significant in the part-time wage equation, this suggests that the offered wage for part-time workers is equal to their actual wage.

For the full-time wage equation two principal conclusions arise. Firstly, the negative sample selection implies that since

$$(5.12) \ln W_{ft} = \bar{X}_{ft}' \hat{\alpha} + \hat{\rho}_1 \bar{\lambda}_1$$

where $\bar{X}_{ft}' \hat{\alpha}$ represents a consistent estimate of an individual's wage offer whether the wage is observed or not, and $\hat{\rho}_1 \bar{\lambda}_1$ represents an estimate of the selectivity bias in the average observed wage for full-time workers. The negative selection coefficient in the full-time wage equation indicates that the current full-time workers earn less than the average which would result if all individuals in this sample worked full-time. Consequently, those who might earn more in the full-time market are choosing not to do so, in

¹⁴ For more information on interpretation of the sample selection term see Dolton, P.J., Makepeace, G.H., (1987).

¹⁵ See Gronau (1974) for more information on the relationship of sample selection to the observed and actual wage distribution.

preference to working part-time. The implications of this result when consideration of a third labour force alternative, that of being not in the labour force, is addressed in the following section.

Thus, it would appear that individuals who work in the part-time sector do so even though they could earn above average full-time wages. This finding is consistent with many overseas studies¹⁶. Although individuals working part-time could earn more in the full-time market, given their level of endowments, their decision to work in the part-time market produces a relatively homogeneous groups of workers with the capacity to earn above average wages in the full-time market.

The question which results from this finding is why do women in the United States and Australia work part-time given these findings? There appears to be two main explanations to this question. Firstly, the average mean wage of part-time work in Australia is 20 per cent higher than for full-time workers, thus although these individuals would expect to earn above average full-time wages, this would be equivalent to average part-time wages. The interpretation of the United States sample selection is more complex and is dealt with in a following section of this chapter. Secondly, females remain the primary care-givers. Hence, in Australia, they are able to perform family responsibilities without the direct wage cost imposed on United States women.

5.4.2 Wage equations for trichotomous choice model

The previous section dealt with the issue of sample selection based upon a dichotomous choice model which represented the decision to work full- or part-time. One difficulty with this specification is that it fails to account for the initial decision work. This section utilises the model of the

¹⁶ See Hotchkiss (1991) for the United States, and Simpson (1986) for Canada.

previous chapter which adopted a choice between three labour market states - not employed, employed part-time, employed full-time. The relationship between the observed outcomes and the unobserved indirect utility function is stated as

$$(5.13) \quad I = 0 \quad \text{if } V_{ji} < 0 \quad \text{.. not working}$$

$$(5.14) \quad I = 1 \quad \text{if } 0 < V_{ji} < \mu_1 \quad \text{.. working part-time}$$

$$(5.15) \quad I = 2 \quad \text{if } \mu_1 < V_{ji} \quad \text{.. working full-time}$$

where μ_1 represent the unknown threshold values of the parameters to be estimated by β^{17} .

Following from the previous section, the specification of the wage equations for full-time and part-time workers can be stated as a function of variables which are believed to affect the offered wage. Given the *a priori* belief that these variables affect the earnings of full-time and part-time workers differently, the specification becomes

$$(5.16) \quad \ln(w_{ft,i}) = X_i' \alpha + \varepsilon_{1i} \quad \text{if } H_i > H^*$$

$$(5.17) \quad \ln(w_{pt,i}) = X_i' \delta + \varepsilon_{2i} \quad \text{if } 0 < H_i < H^*$$

Specification of a three choice outcome, complicates the interpretation of the expectations of the wage equations. The correlation coefficients of ε_1 , ε_2 and μ_1 in marginal distributions with μ are respectively ρ_1 and ρ_2 , and the variances of ε_1 and ε_2 such that

$$(5.18) \quad \varepsilon_1 \sim N(0, \rho_1, \sigma_1^2)$$

$$(5.19) \quad \varepsilon_2 \sim N(0, \rho_2, \sigma_2^2)$$

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This specification follows from that identified by Wright and Ermisch (1991).

where N is a trivariate normal, then the conditional expectations of the wage equations become respectively

$$(5.20) \quad E [W_f] = \gamma X + E [\varepsilon_1 \mid u > \mu_1 - \beta Z]$$

$$(5.21) \quad E [W_p] = \alpha X + E [\varepsilon_2 \mid -\beta Z < u \leq \mu_1 - \beta Z]$$

Following Maddala (1983)¹⁸ we can rewrite the conditional expectations as

$$(5.22) \quad E [\varepsilon_1 \mid u > \mu - \beta Z] = \rho_1 \sigma_1 \{ \phi(\mu - \beta Z) / [1 - \Phi(\mu - \beta Z)] \}$$

and

$$(5.23) \quad E [\varepsilon_2 \mid -\beta Z < u \leq \mu - \beta Z] = \rho_2 \sigma_2 \{ \phi(-\beta Z) - f(\mu - \beta Z) / [\Phi(\mu - \beta Z) - \Phi(-\beta Z)] \}$$

where $\phi(\cdot)$ and $\Phi(\cdot)$ are the standard normal and cumulative normal densities respectively.

Now, the wage equations may be restated as

$$(5.24) \quad W_f = \gamma X + \rho_1 \sigma_1 \lambda_1(\mu, \beta Z) + e_1$$

$$(5.25) \quad W_p = \alpha X + \rho_2 \sigma_2 \lambda_2(\mu, \beta Z) + e_2$$

where e_1 and e_2 are random variables with zero mean distributed independently of X , λ_1 , λ_2 .

¹⁸ Maddala, G.S., (1983), p365-368.

As with the earlier dichotomous choice model, the introduction of the predicted value of the sample selection term leads to unbiased but inefficient estimates of the parameters of the wage equation. Correcting the variance-covariance estimates for this effect requires an adjustment to the standard errors with the resulting t-statistics displayed in Tables 5.4 and 5.5 for Australia and Tables 5.6 and 5.7 for the United States ¹⁹.

5.4.3 Estimation of wage equations for full- and part-time workers with a trichotomous selection term

Tables 5.4 and 5.5 provide estimates of the part- and full-time wage equations adjusted for trichotomous sample selection, for Australian and United States females. Although the human capital model used to explain part-time wages explains only a small amount of the variation in both countries (12 per cent for Australia and 5 per cent for the United States), using a conventional F-test it is possible to reject the null hypothesis which represents restricting the coefficients of the explanators to zero.

It is useful to compare the results from the wage equations with trinomial selection with the unadjusted results of Table 5.2 and 5.3. The part-time wage equation results for Australian females indicate that trichotomous sample selection increases the magnitude of the coefficients on the education terms. However, only the parameter for tertiary qualified females is found to be statistically significant. For the full-time workers with post-school qualifications, sample selection lead to a decrease in the magnitude of the coefficient from 0.122 to 0.094. Both however, remained statistically significant. The tertiary dummy for full-time workers increased from 0.154 to 0.242 between the unadjusted and adjusted

¹⁹ The correction of the variance-covariance matrix for the trichotomous choice model is closely related to the two choice adjustment detailed in Appendix C. The procedure for the correction of the variance-covariance matrix in the trichotomous case was done using a supplementary procedure in LIMDEP.

specification. Again, both remained statistically significant. The experience and experience squared terms in the adjusted and unadjusted part-time equations remained the same at around 0.01 and -0.0001. For full-time workers, however, the magnitude of the experience coefficient in the unadjusted equation dropped from 0.023 to 0.014 in the adjusted equation. This effect is not detected in the dichotomous selection equations.

Unlike the dichotomous specification, the sample selection term (λ) in the wage equations adjusted for trichotomous sample selection is found to be significant in part-time wage equation for Australian females. This indicates that modelling for the additional employment outcome does impact upon the wage equation estimates of part-time workers. Consistent with the dichotomous specification however, sample selection is found to be statistically significant in the full-time wage equation for Australian females.

For the United States, as is found in the dichotomous specification, sample selection is statistically significant in only the full-time equation. The effect of this variable (λ) on the education variables, is to lower the magnitudes of the coefficients. For example, in the unadjusted equation, high school qualifications are predicted to increase an American females wages by 26 percent. In the equation adjusted for trichotomous selection, this effect is estimated to fall to 15 percent. For post-school qualification the difference between the unadjusted and adjusted results are 0.38 and 0.26. A similar significant reduction occurred in the returns to tertiary education after trichotomous sample selection, where the coefficients changes between the unadjusted and adjusted equations from 0.62 to 0.47. All of these coefficients are significant in both specifications. The important point to gain from these results is that a failure to correct the

full-time wage equations for sample selection upwardly biases the coefficients on the regressors.

Overall, the full-time wage equation for Australian females is typical in its ability to explain the data with only 22 percent of the variation explained. For the United States, approximately 20 percent of the variation is explained by this specification of the full-time wages for American females. Using an F-test at the 5 per cent level, both full-time wage equations are significant.

As is found in the results from the previous section, in the United States, the returns to education and experience are higher in full-time work than part-time work. For Australia, the results are reversed. The underlying effects of these results is discussed in the following section.

5.5 Decomposition of the wage differential between females

Since the decomposition of wage differences was first explored by Oaxaca (1974), the most significant change to this decomposition has been the inclusion of the sample selection effects. Recalling the general specification of the wage equation as

$$(5.26) \ln(W_{ft}) = X_1' \alpha + \rho_1 \lambda_1 + \varepsilon_1$$

$$(5.27) \ln(W_{pt}) = X_2' \delta + \rho_2 \lambda_2 + \varepsilon_2$$

where X_1 and X_2 represent a vector of exogenous explanators, λ_1 and λ_2 represent the sample selection variable lambda in the full- and part-time equations, and ρ represents the ratio between the covariance and variance of the choice and wage equations²⁰. The decomposition of the wage differential, as is generally used, may be represented by

²⁰ This relationship may be stated as $(\sigma_{\varepsilon_V} / \sigma_V)$.

TABLE 5.4 : Full- and part-time wage equations, trichotomous selection, females, Australia, 1986

Ordinary least squares regression, (corrected standard errors)

Variable	Part-time		Full-time	
	Coefficient	t-ratio	Coefficient	t-ratio
Constant	2.222	(9.830) *	1.879	(19.585) *
MURBAN	0.093	(0.796)	0.126	(2.907) *
URBAN	0.024	(0.182)	0.056	(1.070)
ED2	0.068	(0.727)	-0.009	-(0.255)
ED3	0.179	(1.486)	0.094	(2.114) **
ED4	0.451	(2.410) *	0.242	(3.746) *
EXP	-0.010	-(0.846)	0.014	(2.476) *
EXP2	0.000	(0.984)	0.000	-(2.093) **
RACE	-0.438	-(0.981)	0.095	(0.416)
OCC2	-0.061	-(0.440)	0.125	(1.688) ***
OCC3	0.034	(0.233)	0.120	(1.635) ***
OCC4	-0.232	-(1.486)	-0.302	-(3.581) *
OCC5	-0.162	-(1.309)	0.040	(0.709)
OCC6	-0.274	-(2.145) **	-0.210	-(3.309) *
OCC7	-0.034	-(0.193)	-0.138	-(1.823) ***
OCC8	-0.381	-(3.014) *	-0.139	-(2.200) **
GOVT	0.014	(0.258)	0.110	(3.645) *
MARRIED	-0.007	-(0.053)	0.047	(1.229)
DIVORCE	0.387	(2.177) **	0.115	(2.105) **
LAMBDA	0.251	(1.645) ***	-0.177	-(2.422) *

N 701
 Mean LHS 2.197
 Adj.R-2 0.116
 F(19,681) 5.833
 Dep. Var. lnw_{hr}

N 887
 Mean of LHS 2.02E+00
 Adjusted R-sc 2.20E-01
 F(19, 867) 1.42E+01

**TABLE 5.5 : Full- and part-time wage equations, trichotomous selection,
Females, United States, 1987**

Ordinary least squares regression, (corrected standard errors)

Variable	Part-time		Full-time	
	Coefficient	t-ratio	Coefficient	t-ratio
Constant	1.318	(6.006) *	1.553	(14.110) *
CITY	0.033	(0.376)	0.159	(5.132) *
MSA	0.077	(1.073)	0.206	(7.578) *
ED2	0.057	(0.391)	0.152	(2.668) *
ED3	0.121	(0.741)	0.257	(3.928) *
ED4	0.367	(2.023) **	0.473	(6.564) *
EXP	0.004	(0.371)	0.034	(8.407) *
EXP2	0.000	-(0.534)	-0.001	-(6.970) *
RACE	-0.023	-(0.217)	-0.025	-(0.724)
OCC2	0.194	(1.135)	-0.054	-(1.176)
OCC3	-0.067	-(0.403)	-0.197	-(4.261) *
OCC4	-0.101	-(0.620)	-0.151	-(3.835) *
OCC5	-0.142	-(0.867)	-0.537	-(10.893) *
OCC6	-0.486	-(2.074) **	-0.627	-(7.217) *
OCC7	0.292	(0.642)	0.049	(0.631)
OCC8	-0.136	-(0.632)	-0.212	-(4.079) *
GOVT	0.144	(1.643) ***	0.046	(1.442)
MARRIED	0.172	(1.581) ***	-0.013	-(0.401)
DIVORCE	0.352	(2.410) *	-0.058	-(1.321)
LAMBDA	0.026	(0.215)	-0.184	-(2.578) *
Observations	1109		3006	
Mean of LHS	1.61E+00		1.92E+00	
Adjusted R-squared	4.56E-02		1.96E-01	
F(19, 1089)	3.79E+00		F(19, 2986)	3.95E+01
Dep. Var. = lnwhr				

$$(5.28) \quad \bar{W}_{ft} - \bar{W}_{pt} = (\hat{\alpha}_{ft} - \hat{\delta}_{pt}) \bar{X}_{pt} + (\bar{X}_{ft} - \bar{X}_{pt}) \hat{\alpha}_{ft} + (\hat{\rho}_1 \bar{\lambda}_1 - \hat{\rho}_2 \bar{\lambda}_2)$$

(1)
(2)
(3)

where all symbols are as previously defined with all estimates evaluated at their respective mean. From equation 5.26, it may be observed that the decomposition involves three separate elements.

The first element, $(\hat{\alpha}_{ft} - \hat{\delta}_{pt}) \bar{X}_{pt}$ represents the differences in the coefficients of the full- and part-time equations, weighted by the mean of the part-time workers endowments vector. This element may represent differences in productivity or discrimination, mismeasurement of the regressors or omission of important variables which affect wages. However, the exact contributions of these factors to the wage differential remains unexplained.

The second element, $(\bar{X}_{ft} - \bar{X}_{pt}) \hat{\alpha}_{ft}$ represents the differences in the average level of endowments between full- and part-time workers, weighted by the coefficients from the full-time equation.

The third element, $(\hat{\rho}_1 \bar{\lambda}_1 - \hat{\rho}_2 \bar{\lambda}_2)$ represents the differences between the sample selection effects of the full- and part-time equation.

In apportioning differences in wages to endowments, sample selection and unexplained differences three relatively strong assumptions are utilised. The first assumption is that all factors which affect productivity differences, and are not strongly endogenous to each other are included in the regression equation. Second, all variables used as explanators are measured without error, which includes not only the reliability of the estimates but also functional form and an appropriate error structure. Thirdly, in any analysis of sample selection, it is assumed that the factors which proxy the underlying causes of non-random selection may be accurately determined. In all three cases, the probability that these

assumptions are met in practice would appear to be quite low. Although some researchers have attempted to estimate the effect of the violation of each of these assumptions²¹, the overall effect of the sensitivity of the estimates to the violation of these assumption has not been undertaken for obvious practical reasons.²² As a result of these factors, the results should be viewed as indicative only.

5.6 Estimation of full- and part-time differentials for females

Table 5.6 illustrates the average wage differential between full- and part-time work for both Australian and United States' females. The raw wage differential between full- and part-time workers in Australia is minus 17 percent. For the United States, the raw wage differential between full- and part-time workers is plus 30 percent. That is, in Australia, part-time workers earn 17 percent **more** per hour than full-time workers. For the United States, part-time workers earn 30 percent **less** per hour than full-time workers. Two questions are apparent from this results. Firstly, why do these differences occur ? Secondly, why are the differences in different directions?

In the previous section, the wage differential is divided into three components. Unexplained differences are estimated to account for a 20 percent increase in full-time wages relative to part-time wages in Australia. For the United States, unexplained differences increased the full-time wage by 32 percent relative to part-time workers. Endowment differences are estimated to have a very small effect on the Australian wage differential between full- and part-time workers. For the United States, endowment

²¹ See Lambert (1991) for an analysis of the effect of mismeasurement of experience in a human capital model, and Hirsch and Addison (1986) for a critique on the role of sample selection terms in a wage equations. Kidd (1992) analyses for Canada the effect of incorrectly treating occupational outcomes as exogenous, and the role of Mincer's experience proxy in the estimation of the gender wage differential.

²² An analysis of the effects of this problem may be found in Daymont and Andrisani (1984) .

TABLE 5.6 : Summary of female wage differential between full-and part-time workers, Australia and the United States (a)

	Australia	United States
Observed differential (b)		
$(\ln W_{ft} - \ln W_{pt})$	- 0.17	0.30
Decomposition effects :		
(1) unexplained differences	0.20	0.32
(2) endowment differences	0.02	0.13
(3) sample selection effects	-0.39	-0.15

Notes :

(a) differences in log hourly wages for trichotomous model. The results differ from those reported in Hawke (1992) which utilise the dichotomous model. The implication of this difference in treatment is large differences in the sample selection effects. Since the observed differential is unchanged, the offsetting effect is borne by productivity differences.

(b) full-time work is treated as base for decomposition. See Sloane (1985) for index number problem associated with this decomposition.

differences accounted for a 13 percent wage differential between full- and part-time workers. That is, whilst endowments are relatively unimportant in explaining the wage differences between females working full- and part-time in Australia, they are estimated to be important in the United States. Finally, sample selection effects are estimated to increase the wage of Australian females working part-time relative to females working full-time by 39 percent. For the United States, this effect is in the same direction as Australia, however, the magnitude of the effect is estimated to be 15 percent.

These findings are very interesting. In order to understand the implications of these results, it is useful to recall the discussions of Chapters 2 and 3. Australia differs from the United States in that wages are centrally determined by an industrial tribunal which imposes wage levels and relativities on the Australian labour market. In the preceding chapter

we discussed how these tribunals have determined that part-time workers should obtain wages which are equivalent to the returns to full-time work. Thus, the institutional determination of wage relativities between full- and part-time workers is consistent with the result of an observed raw differential of 17 percent.

Having found that institutions do influence wage outcomes, it would be unreasonable to expect the market not to respond to these effects. In Chapter 4 we analysed one method with which the market may respond - through employment levels. However, as has been found by Gregory *et. al.* in the case female wages relative to male wages, an increase in the cost of part-time workers did not lower the demand for these workers, but rather, the number of part-time workers increased. The advantage of this decomposition is that we may gain some insights into why this phenomenon occurred.

As noted earlier, the wage differential between full- and part-time workers does not appear to be explained by differences between the directly observed human capital characteristics of individuals in full- and part-time work²³. In terms of the work undertaken in Chapter 2, it would appear that human capital does not have a role in explaining the wage differential between full- and part-time workers. Obviously it is necessary to look at the other components of the decomposition for an explanation of this differential.

Sample selection factors represent the unobserved characteristics of individuals which are thought to influence the wage. One interpretation of these unobserved factors is the quality of an individual. For example, we can measure whether an individual has completed high school, but we are

²³ This result is consistent with the findings of Australian studies which analyse the wage differential between males and females working full-time, such as Gregory and Ho (1985) and Chapman and Mulvey (1986)

unable to determine whether this individual is highly motivated or quick to grasp new ideas. In some ways, sample selection may be interpreted as reflecting these unobservable qualities. If this is the case the sample selection result for Australia indicates that the part-time labour market in Australia is adjusting to the institutionally determined wage, not by reducing the number of part-time workers, but by picking the highest quality workers which allow employers to compensate themselves for the imposed wage.

However, these effects have been offset to some extent by the differences in the coefficients of the full- and part-time wage equation. As mentioned earlier, these differences are often thought to result from either discrimination or productivity differences. In the male/female case, many analysts have interpreted this effect as discrimination. If this analysis of full- and part-time workers is identical to the male/female analysis, this result would be interpreted as representing discrimination against part-time workers, in favour of full-time workers, to the extent of a 20 percent wage difference. However, in this case we have the added insights provided by the sample selection term and the analysis from Chapter 4. Thus, given that the sample selection term indicates that the better quality workers are being employed on a part-time basis, it could be expected that better quality workers would be more productive. Therefore, the 20 percent wage difference which results from unexplained factors, suggests that perhaps discrimination is very important, given the high quality of part-time workers.

For United States, where institutions are not as important in the determination of wages as Australia, the wage of full-time workers is estimated to exceed that of part-time workers by 30 percent. This result is consistent with the theories of wage determination discussed in Chapter 3. Unlike Australia, the United States results indicate that the characteristics

of full- and part-time workers do contribute to the wage differential by around 13 percent. That is, the measurable characteristics of full-time workers are, to some extent, better than that observed for part-time workers. This difference results in the wages of part-time workers in the United States being 13 percent lower than their full-time counterparts.

Sample selection differences in the United States do lead to a reduction in the wage differential between full- and part-time workers by 15 percent. As for the Australian case, we may interpret this effect as representing to some degree, difference in the quality of the individuals in full- and part-time work. In the United States, part-time work is sometimes thought of as being 'bad' in terms of the jobs that are undertaken and the workers who are employed. This result suggests that whilst part-time jobs may be considered bad as a result of their hourly wage being lower than full-time jobs, it is not possible to categorise the females working part-time as poor quality workers.

Finally, the unexplained differences between full- and part-time workers contribute to a 32 percent wage difference between these groups. This contribution is larger than the raw differential. As for Australia, it is not possible to ascribe the total of this effect to discrimination, however, since the sample selection contribution is lower than that estimated for Australia, it is plausible that the discriminatory component in the United States case is higher than for Australia.

5.7 Conclusions

Previous chapters have analysed the role of part-time work over time in Australia and the United States. This chapter focussed upon 1986 for Australia and 1987 for the United States in an attempt to examine possible explanations for the wages of part-time workers being around 20 per cent

more per hour than full-time workers in Australia, and approximately 30 per cent less per hour in the United States.

This chapter utilised a human capital model to explain the wages of individuals in full- and part-time work. Factors such as education, experience, occupations, marital status and geographic location are used to explain the wages individuals receive. Additionally, the results from Chapter 4 are included in the specification of the models to account for sample selection effects. The results from the full- and part-time wage equations are then compared. For Australia, the returns to education and experience in part-time work are estimated to exceed the returns to full-time work. For the United States, the reverse effect is estimated to occur.

Utilising the estimates from the wage equations for both countries, the wage differential between full- and part-time workers is decomposed into three factors. These factors represented endowment differences, sample selection differences, and finally differences which are unexplained by the model but which may be thought to be influenced by factors such as discrimination, productivity differences or mismeasurement.

The main conclusions from the wage decompositions involve three points. Firstly, human capital does not explain the differences between the wages of full- and part-time workers in Australia to any significant degree, but is an important explanator in the United States.

Secondly, institutions have an important role in the determination of wages in Australia, and the effect of their intervention has been to increase the wage of part-time workers relative to full-time workers. Since previous chapters have illustrated that employers did not respond to this intervention by reducing the role of part-time work in the workforce, further explanation is required. Sample selection is interpreted as reflecting the unobserved characteristics of individuals, and using the results from the trichotomous choice model of the previous chapter, it is estimated that employers adjust

to the higher part-time wage by employing better quality workers. For the United States, whilst the endowment effect indicated that part-time workers did have lower levels of human capital than full-time workers, they could not be categories as poor quality workers.

Thirdly, in both countries a relatively large proportion of the wage difference between full- and part-time workers remained unexplained by the model. To some extent this effect may represent differences in productivity or discrimination between full- and part-time workers. However, other factors may also be important in explaining this wage differential. One of the main influences on wages is occupations, and in the following chapter, the effect of different occupational distributions on the wages of females working full- and part-time is investigated.

CHAPTER SIX

OCCUPATIONAL SEGREGATION AND THE WAGES OF FEMALES WORKING FULL- AND PART-TIME

6.1 Introduction

It is well known that an individual's occupation affects wages, promotion possibilities and flexibility in the timing and level of work. Internationally, the evidence suggests the

overall earnings distribution depends heavily upon occupational differences in earnings : for example, women earn less than men on average, largely because there are few women in the higher paid occupations¹.

Not only do the occupations of men and women differ, but as Holden and Hansen (1987) and Blank (1990) demonstrate for the United States, there exists occupational segregation among full- and part-time jobs. This chapter adds to the findings of Chapter 5 in two ways. First, given that occupational distributions have a role in the determination of aggregate wages, this chapter estimates the effect on wages of changing the existing distribution of part-time workers to that of full-time workers. This process allows the estimation of the magnitude and direction of changes in wages which would be predicted to occur if part-time workers adopted the occupational distribution of full-time workers.

The second contribution relates to occupational attainment of individuals. Using human capital characteristics, occupational outcomes are predicted for particular groups. That is, occupations are no longer treated as being exogenously determined. This approach has the advantage of utilising

¹ OECD, (1987), Employment Outlook, September, p67

the skills and attributes of individuals in part-time work, to estimate their occupational attainment given equal access into occupations as full-time workers. This allows insights into possible occupational discrimination on the basis of labour force status.

For both countries it is found that the wage regressions did not explain an important component of the difference between full- and part-time wages. The explained component of these decompositions is often interpreted as reflecting either productivity differences and/or discrimination. One possible source of the estimate of discrimination is the different occupations distribution of full- and part-time workers. Two factors need to be considered in the relationship between discrimination and occupational outcomes. First, perhaps employers practise wage discrimination within particular jobs. Therefore, if there exists some job segregation between full- and part-time jobs, and these jobs are subject to different levels of discrimination with respect to their wage, then this may lead to the wage differential between full- and part-time jobs.

Second, if women either choose or are constrained in their choice of occupation as a result of their labour force status, then this may effect the wages they are able to achieve, irrespective of their skills and productivity. It is widely accepted that occupational mix is influential in the determination of wage outcomes, and, that part-time workers have (on average) a more concentrated occupational mix. One reason for the possible importance of occupations is that Australian institutional wage setting practices determine wage minimums for each occupation. Additionally, wage bargaining before

Federal and State wage tribunals is usually undertaken by employer and unions groups which are based around occupational collectives².

6.2 Occupational segregation of females

In any discussion of wages and occupational segregation, the role of choice and opportunity becomes an issue. One succinct evaluation of the problem of occupational segregation may be found in Beller (1982)

If more than half the population is denied access to 60 percent of the occupations, being crowded into a few at lower earnings, equality of opportunity does not exist. But if women freely choose to enter only a third of all occupations and those occupations pay less, then women's lower earnings may not be a fundamental social problem. The major issue is whether the dramatic differences in occupational distributions of the sexes result from different choices made by each, given equal opportunities, or from unequal opportunities to make similar choices.³

This analysis, although applied to gender related occupational segregation, is equally applicable to full- and part-time occupational segregation. If women are forced into certain occupations that earn lower pay as a result of their desire⁴ to work part-time, the policy implications regarding occupational segregation are quite different from equal opportunities for part-time work in all occupations and women freely choosing those occupations that pay less on average. In the former case, implementation of schemes which encourage employers for provided child care facilities would allow part-time workers to enter all occupations on the basis of skill and motivation,

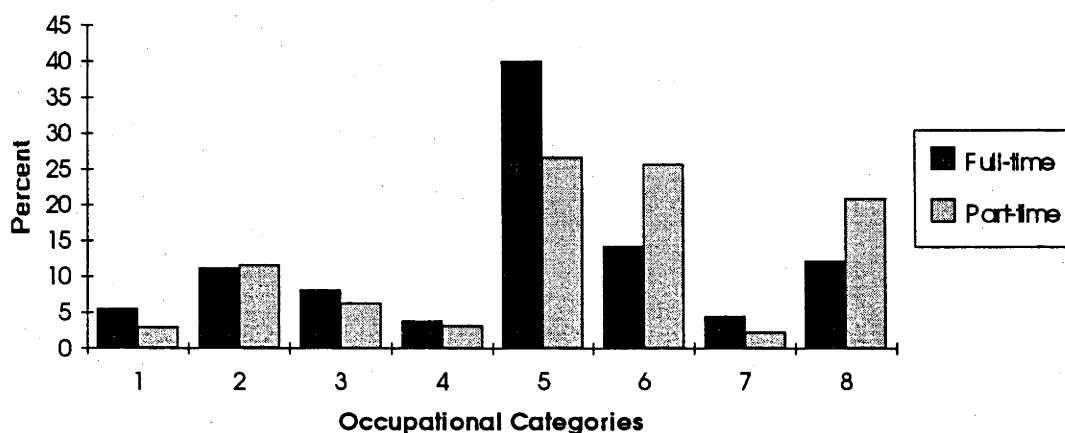
2 In this decade however, there has been significant developments on industry-based unions, where small occupational based unions are amalgamated into a single union with members exceeding 100,000 members.

3 Beller, A.H.,(1982),p372

4 It should be noted that the preference for part-time work may be a constrained preference which results from females being the primary care giver in families with children.

rather than being constrained to occupations which allow flexibility to undertake family and work commitments. If, however, occupational segregation is not the result of constrained choices or discriminatory practices, policies such as employer sponsored child care would not be expected to improve either the occupational density or wage inequality of part-time workers.

Figure 6.1 : Australian Female Occupational Distribution, by labour force status



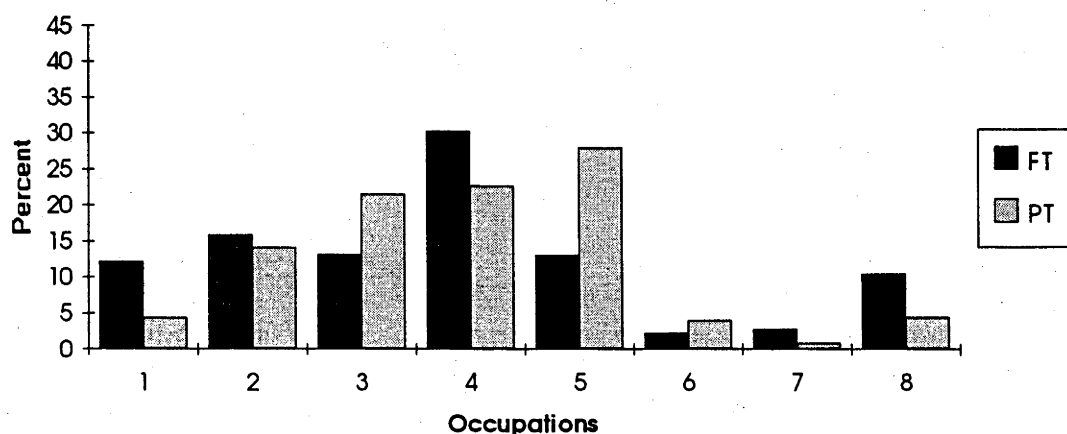
Source : 1986 Population and Housing (Census) data tape

Figures 6.1 and 6.2 provide a graphical illustration of occupational representation by labour force status for Australian and United States' females respectively.⁵ In Figure 6.1, for 1986 most Australia females are represented in the professional, clerical, sales and personal service and labourers and related workers. From Figure 6.2, which represents the occupational structure of female in the United States in 1987, the occupational structure would

⁵ The occupational numbering follows that identified in appendix A and B.

appear to be less concentrated than Australia, with the largest representation in full- and part-time work being ⁶ the trades and clerical occupations.

Figure 6.2. United States Female Occupational Distribution, by labour force status



From many studies of earnings, industries have often been found to be an important determinant of wages. Figures 6.3 and 6.4 provide a graphical representation of the industrial concentration of females by labour force status, for Australia and the United States respectively. It can be observed that for both countries females working full- and part-time are not concentrated in any particular industry. Unlike occupational segregation, industry concentration

⁶ The classifications identified for the United States have been altered from the raw occupational classifications provided in the data tape in order to be consistent with Australian Standard Classification of Occupations used in the Australian Census data. In comparison the U.S. sample used in this paper and that used by Blank (1990) do not appear to be significantly different using the CPS occupational classifications.

Figure 6.3. Australian Female Industrial Distribution, by labour force status

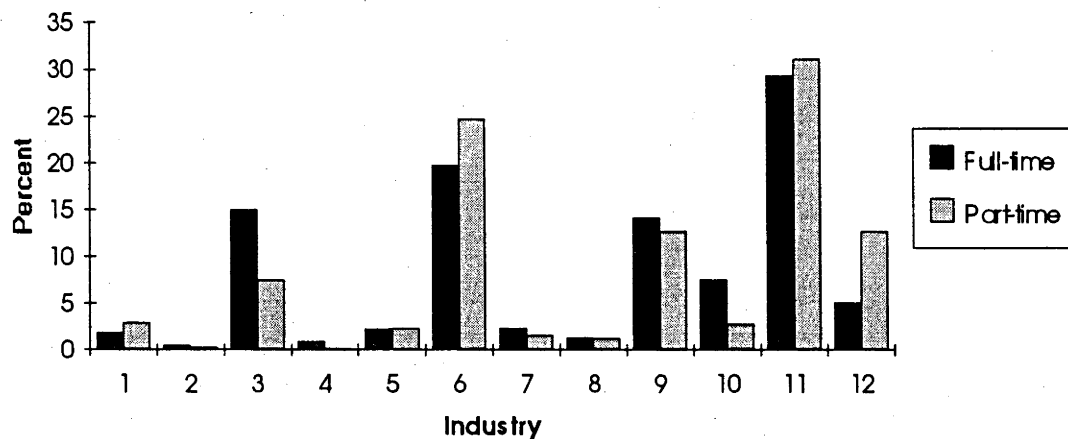
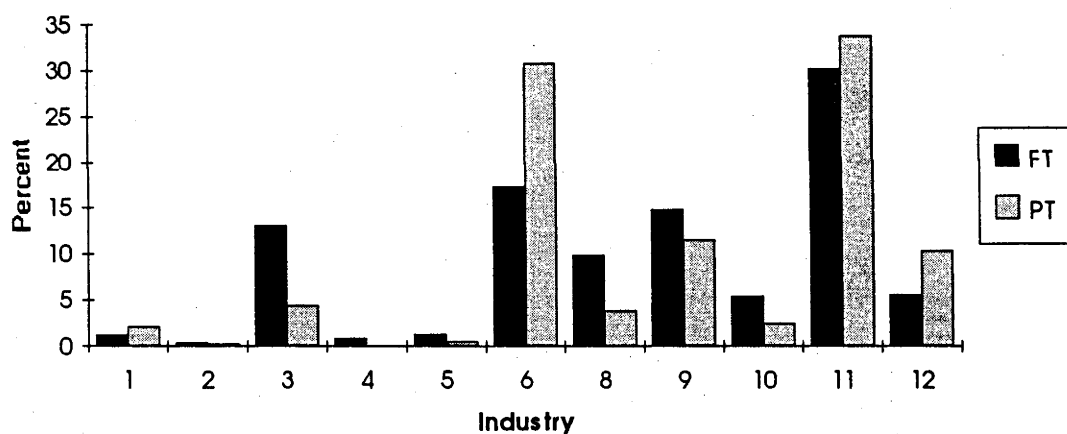


Figure 6.4. United States Female Industrial Distribution, by labour force status



does not appear to differ (with respect to their employment of females) between Australia and the United States⁷.

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Subsequent estimations of wage equations incorporating industries into the model developed in the preceding chapters revealed that at conventional levels of significance, using an F-test, the null-hypothesis that the industry coefficients were not significantly different from zero for part-time workers is accepted. The results of these specifications are provided in Appendix G.

The persistence of occupational segregation has led many researchers to investigate the reasons⁸ for gender differences. Most analysis has ignored the full- and part-time dichotomy⁹.

In their analysis of the United States between the years 1971, 1976 and 1981 Holden and Hansen (1987) examine whether changes in part-time jobs have contributed to changes in the degree of segregation of the workforce as a whole. Their analysis supports the hypothesis that there is a higher degree of occupational segregation among part-time job holders, but segregation declined more in the 1970s for the part-time work force. The decline in segregation is attributed to a decline in the segregation of some part-time jobs as well as part-time job growth in occupation which had a more integrated gender mix.

For Australia, no comparable analysis on occupational segregation has been conducted for full- and part-time workers.

6.3 Factors which affect the wages of part-time workers

In the previous chapter we defined in equation 5.28 the wage differential between full- and part-time workers . This differential may be redefined as¹⁰

$$(6.1) \quad \ln \bar{W}_f - \ln \bar{W}_p = (\hat{\alpha}_f - \hat{\gamma}_p) + \bar{X}_p (\hat{\beta}_f - \hat{\delta}_p) + (\bar{X}_f - \bar{X}_p) \hat{\beta}_f$$

(1) (2) (3)

⁸ See Polachek, S.W., (1979); Beller, A.H., (1982); England, P., (1982)

⁹ Exceptions are Corcoran, M., Duncan, G.J., Ponza, M., (1988) and Holden, K., Hansen, W. L., (1987). Both these analyses are for the U.S. labour market.

¹⁰ In the previous chapter, this equation was extended to incorporate sample selection effects. This section, however, is merely intended to reflect the magnitude of possible wage changes for existing workers, when occupational outcomes are treated as exogenous. The effect of sample selection and occupational outcomes is evaluated in the following section.

where $(\hat{\alpha}_f - \hat{\gamma}_p)$ represents the differences in the intercept term from the full- and part-time wage equations, respectively. The second term, reflects differences in coefficients between the two equations, and as before, this effect is interpreted as reflecting the degree of discrimination between these groups. The third term represents differences in endowments.

This specification may be further expanded to identify the occupational characteristics separately as

$$(6.2) \quad \ln \bar{W}_f - \ln \bar{W}_p = (\hat{\alpha}_f - \hat{\gamma}_p) + \bar{X}_p (\hat{\beta}_f - \hat{\delta}_p) + (\bar{X}_f - \bar{X}_p) \hat{\beta}_f + (\bar{O}_f - \bar{O}_p) \hat{\beta}_f$$

(1) (2) (3) (4)

where the X vector for full- and part-time workers is now partitioned into two components. The first is the individual specific factors detailed in equation 6.1. Occupational classifications however, are now represented in the O vector for full- and part-time workers. All other symbols are as previously defined.

As is applicable to the decompositions in chapter 5, it is appropriate to discuss two points relating to the specification of this differential. Firstly, although the first two terms in equations 6.1 are unexplained in terms of observable characteristics, and hence may be significant indicators of discrimination, they may also reflect omitted variables or mismeasurement.

Secondly, the specification of the human capital model should include variables which are thought to be exogenous to the wage determination process. If factors which affect occupational choice are unrelated to factors which affect wages then the specifications of the previous chapter is valid. It is difficult to accept that this rather strict assumption. Furthermore, there is an

additional problem. This approach ignores the possibility that occupational segregation may be the result of discriminatory factors which restrict entry into specific occupations. This issue will be addressed in the following section of this chapter.

Extending equation 6.2 to account for sample selection, we may restate the wage differential between full- and part-time workers as being apportioned to four factors. These factors are differences which are unexplained by the regression equations, differences in the level of endowments, occupational segregation effects and differences in the average effect of sample selection on wages. Algebraically we may state this decomposition as

$$(6.3) \quad \ln \bar{W}_f - \ln \bar{W}_p = (\hat{\alpha}_f - \hat{\gamma}_p) + \bar{X}_p (\hat{\beta}_f - \hat{\delta}_p)$$

(1)
(2)

Unexplained

$$+ (\bar{X}_f - \bar{X}_p) \hat{\beta}_f + (\bar{O}_f - \bar{O}_p) \hat{\beta}_f + (\hat{\rho}_1 \bar{\lambda}_1 - \hat{\rho}_2 \bar{\lambda}_2)$$

(3)
(4)
(5)

Endowments
*Occupational
Segregation*
*Sample
Selection*

Each of these effects may be investigated by a comparative analysis of actual and predicted wages. The scenarios used in the determination of the predicted wages are : (i) part-time workers have the average productivity endowments of full-time workers; (ii) part-time workers are paid the same reward for their skills as full-time workers; and (iii) part-time workers are distributed across occupations in the same way as full-time workers. This wage analysis is extended by comparing discrimination against part-time

workers in both Australia and the United States through a comparison of the wages which would accrue to Australian part-time workers if the centralised wage system of Australia is replaced with the more market-based arrangements dominant in the United States.

The predicted average female part-time wage can be estimated using the endowments, coefficients and occupational distribution of full-time workers in the following specification in the manner identified in equations 6.4, 6.5 and 6.6.

$$(6.4) \quad \ln \bar{W} = \hat{\alpha}^p + \sum_j \hat{\beta}^p \bar{X}^f + \sum_j \hat{\beta}^p \bar{\lambda}^p + \sum_j \hat{\beta}^p \bar{O}^p$$

(Endowment effects)

$$(6.5) \quad \ln \bar{W} = \hat{\alpha}^f + \sum_j \hat{\beta}^f \bar{X}^p + \sum_j \hat{\beta}^p \bar{\lambda}^p + \sum_j \hat{\beta}^f \bar{O}^p$$

(Coefficient effects)

$$(6.6) \quad \ln \bar{W} = \hat{\alpha}^p + \sum_j \hat{\beta}^p \bar{X}^p + \sum_j \hat{\beta}^p \bar{\lambda}^p + \sum_j \hat{\beta}^p \bar{O}^f$$

(Occupational distribution effects)

The symbols are p for part-time workers, f for full-time workers, α and β are coefficients, X is a vector of explanatory variables excluding sample selection and occupational dummies which are now in the vectors λ and O respectively. All variables are evaluated at their respective means. Using this breakdown, it is possible to compare the relative importance of each of these factors on the wage differential.

In the case of equation 6.4, the outcome can be interpreted as the wage part-time workers would receive if they had the same skill increment as

currently exists, but had the productivity endowments of full-time workers (that is, the factors such as education and experience). For equation 6.5, the outcome can be interpreted as the average wages females working part-time would receive if they achieved the same skill increments as full-time workers (given their current levels of productivity endowments). The final equation, equation 6.6, can be interpreted as the wage that would result if part-time workers had their current levels of endowments and received their existing same skill increment, but are distributed into occupations in the same proportion as full-time workers.

Table 6.1 summarises the effect on average part-time wages of females in Australia and the United States of each of these scenarios. Using Table 6.1, it is possible to identify that if Australian females working part-time have the average endowments of Australian females working full-time (scenario 1), their wages would decrease by 3 percentage points. If Australian females working part-time had the same skill increments Australian females working full-time (scenario 2), their wages would increase by 2 percentage points. If Australian females working part-time have the occupational distribution Australian females working full-time, their wages would increase by 4 percentage points (scenario 3).

One of the most interesting components of a two country analysis is that it is possible to predict the effect upon the wages of individuals in one country, based upon the wage outcomes of comparable individuals in the other country. In this study, a natural experiment can be conducted between the industrial relations systems of Australia and the United States. In comparing the industrial relations arrangements for both countries, the broad difference between the countries in terms of wage outcomes for full- and part-time workers is focussed upon the centralised and free-market nature of the

respective Australian and United States' systems. The United States' system does not provide any specific wage guarantee to part-time workers, unlike Australia where the part-time wage is, at least set equal to the *pro rata* full-time wage.

The current policy debate in Australia includes a discussion of the relative effects of changing the Australian industrial relations system into a United States type free-market, enterprise based system of wage negotiations. Although the exact effects of changing the current award based centralised system of Australia is beyond the scope of this chapter, it is possible to draw some insights into the effect on aggregate part-time wages of changing Australian institutional arrangements to that of the United States. Table 6.1 shows that if Australian females working part-time are rewarded for their endowments as their United States counterparts are (scenario 4), then their wage, relative to Australian full-time workers would decrease by an extremely large 51 percentage points.

The interpretation of this finding is that the wage of Australian females working part-time is predicted to fall by 51 percentage points if the wage system which is present in the United States is adopted in Australia. That is, these results support the proposition that the centralised system is enhancing the wages of females working part-time, and hence any abandonment of centralism will affect the wages which accrue to these workers. It is interesting to note that this findings support those of Gregory *et. al.* (1985) in the context of males and females working full-time. Thus, not only does the Australian institutional structure help females relative to males, it also assists part-time workers relative to full-time workers. This issue is expanded upon in the next chapter.

In the comparative United States analysis, it is predicted that if United States' females working part-time have the average endowments of United States' females working full-time, their wages would increase by 4 percentage points. If United States' females working part-time had the same skill increments as United States' females working full-time, their wages would increase by 21 percentage points. Finally, if United States' females working part-time have the occupational distribution as United States' females working full-time, their wages would increase by 6 percentage points. Thus, unlike Australia, where changes in the relative skill increments of full- and part-time workers only causes small changes to part-time wages, in the United States, large changes are predicted to occur. This result provides support for the proposition of a segmented labour market in the United States between full- and part-time work, but a relatively homogenous labour market for females working full- and part-time in Australia.

TABLE 6.1: Predicted wages changes under various scenarios

Scenario	Australia	United States	Ratio Aust/US
Actual differential $W_{ft} - W_{pt}$	-0.20	0.30	1.35
Part-time wage predictions : - percentage point change (a) -			
Scenario 1	-0.03	0.04	-0.05
Scenario 2	0.02	0.21	-0.14
Scenario 3	0.04	0.06	-0.02
Scenario 4	-0.51	0.44	-0.54

(a) represents the change in the log of hourly wages between actual and predicted outcomes.

Thus, -0.03 represents a predicted decline in wages of 3 percentage points as a result of a scenario.

6.4 The effect of occupational attainment on wages

Some researchers have questioned the inclusion of occupational status in the earnings equation¹¹. Incorporation of occupational dummies into the endowments vector assumes an exogenously determined occupational structure thereby biasing estimates of discrimination. That is, this approach explicitly ignores the possibility that there is a relationship between the determinants of wages and occupations. If individuals are discriminated against in their choice of occupations, then the above approach will underestimate the effects of discrimination¹².

Approaches to overcome this problem have been developed by Brown *et. al.*(1980) and Miller (1987). Following Miller's¹³ methodology, we may estimate a discrete regression model to predict the probability that an individual will be employed in one of eight occupations, namely : (1) managers and administrators; (2) professionals; (3) para-professionals; (4) tradespersons; (5) clerks; (6) salespersons and personal service workers; (7) plant and machine operators and drivers; and (8) labourers and related workers¹⁴.

The conditional probability that individual i is represented in occupation j may be specified as

$$(6.7) \quad \Pr (P_{ij} | Z_i) = f (Z_i)$$

¹¹ Brown, Moon and Zoloth (1980), Miller, P.W.(1987), Kidd, M.J.,(1992)

¹² This means that the resultant wages from changes in the coefficients (which will be analogous to the scenarios developed in the preceding section) will be underestimated.

¹³ Miller and Volker (1985) argue that in cases such as this, ordered probit is preferable to other probability models such as multinomial logit used by Brown *et.al.*(1980) as multinomial logit ignores any implicit ordering which may exist in occupational classification.

¹⁴ The occupational ordering follows from the ASCO listings which is intended to capture the skill requirements and demands of each occupation as well as other associated aspects such as remuneration and desirability

where Z_i is a vector of personal, demographic and human capital characteristics. The predicted conditional probability of an individual being observed in occupation j is specified as

$$(6.8) \quad P_{ij} = \Phi(\mu_j - \alpha Z_i) - \Phi(\mu_{j-1} - \alpha Z_i)$$

where Φ represents the standard normal cumulative density function, α the estimated coefficients, and μ the estimate separation points.¹⁵

Tables 6.2 to 6.3 represent the ordered probit results for occupational attainment for females working full- and part-time in Australia and the United States. The parameters in the tables are difficult to interpret directly, however a positive coefficient indicates a higher probability of being located in an occupation higher on the occupational classification values. To highlight the underlying determinants of occupational outcomes, Table 6.4 is used to identify occupational distributions of females in each country if their occupational attainment is based on the same principles as for the alternative labour force group. Interestingly, this table provides an indication of whether part-time workers choose the occupations because they are the only part-time jobs or whether irrespective of labour force status, the representation of currently employed part-time workers would change.

Using equation 6.6 and 6.7 the probability of individuals being represented in an occupational distribution for part-time workers if occupational attainment is based upon the existing entry propensities given an individual's characteristics is estimated. The actual and predicted occupational distributions for Australia and the United States are provided in Table 6.4.

15 For more information see Greene, W.,(1990).

TABLE 6.2 : Australian Females Occupational Choice Model¹⁶

Variable	Part-time		Full-time	
	Coefficient	Std. Err.	Coefficient	Std. Err.
race	0.381	0.440	0.196	0.341
ed2	-0.392	0.085	-0.287	0.074
ed3	-1.030	0.095	-0.849	0.082
ed4	-1.619	0.167	-1.280	0.113
exp	-0.022	0.014	-0.029	0.010
exp2	0.000	0.000	0.001	0.000
murban	0.113	0.109	0.157	0.099
urban	0.158	0.122	0.154	0.116
married	0.010	0.125	-0.011	0.078
divorced	0.153	0.172	0.056	0.112
_cut1	-2.763	0.179	-2.315	0.143
_cut2	-1.794	0.163	-1.628	0.137
_cut3	-1.479	0.160	-1.273	0.135
_cut4	-1.343	0.159	-1.128	0.134
_cut5	-0.490	0.154	0.060	0.131
_cut6	0.300	0.153	0.556	0.132
_cut7	0.385	0.153	0.772	0.133
Number of obs = 899		Number of obs = 1304		
chi2(10) = 215.74		chi2(10) = 252.40		
Prob > chi2 = 0.0000		Prob > chi2 = 0.0000		
Pseudo R2 = 0.0682		Pseudo R2 = 0.0544		
Log Likelihood = -1473.4751		Log Likelihood = -2193.1561		
Dep. Var. = Occupation		Dep. Var. = Occupation		

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These estimates were derived from using STATA version 3. For further information regarding output from the ordered probit, see Computer Resource Center, (1992), p77-85

TABLE 6.3 : United States' Females Occupational Choice Model

Variable	Part-time			Full-time		
	Coefficient	Std. Err.		Coefficient	Std. Err.	
race	0.166	0.092	***	0.342	0.053	*
ed2	-0.581	0.114	*	-0.661	0.072	*
ed3	-0.984	0.126	*	-1.134	0.080	*
ed4	-1.577	0.127	*	-1.783	0.080	*
exp	-0.014	0.009		-0.026	0.006	*
exp2	0.000	0.000		0.000	0.000	*
city	-0.061	0.079		-0.194	0.047	*
msa	-0.120	0.064	***	-0.170	0.042	*
married	-0.092	0.097		-0.076	0.052	
divorce	0.071	0.128		0.061	0.063	
_cut1	-3.082	0.150		-2.708	0.099	
_cut2	-2.162	0.140		-2.044	0.096	
_cut3	-1.416	0.135		-1.603	0.095	
_cut4	-1.393	0.135		-1.522	0.095	
_cut5	-0.753	0.133		-0.577	0.093	
_cut6	0.378	0.133		-0.006	0.092	
_cut7	0.767	0.138		0.918	0.098	

Number of obs = 1334
chi2(10) = 264.86
Prob > chi2 = 0.0000
Pseudo R2 = 0.0570
Log Likelihood = -2190.9113
Dep. Var. = Occupation

Number of obs = 3289
chi2(10) = 864.94
Prob > chi2 = 0.0000
Pseudo R2 = 0.0706
Log Likelihood = -5695.7334
Dep. Var. = Occupation

TABLE 6.4 : Actual and Predicted Occupational distributions

	OCC1	OCC2	OCC3	OCC4	OCC5	OCC6	OCC7	OCC8
Australia								
Actual FT	0.056	0.112	0.082	0.038	0.401	0.143	0.046	0.123
Actual PT	0.029	0.116	0.063	0.033	0.267	0.258	0.024	0.210
Simulated PT	0.050	0.099	0.085	0.041	0.411	0.141	0.046	0.125
United States								
Actual FT	0.122	0.159	0.131	0.067	0.303	0.131	0.104	0.023
Actual PT	0.044	0.141	0.215	0.008	0.227	0.280	0.045	0.040
Simulated PT	0.114	0.148	0.136	0.027	0.310	0.135	0.103	0.026

Note : simulation refers to the predicted occupational distribution of say full-time workers if they adopted the same occupational structure as part-time workers given their characteristics. Of, course the reverse is true for part-time workers. In essence, the question asked is where would the part-time workers be if they were allocated in the same manner as full-time workers ?

The predicted occupational outcomes are utilised in the following section to weight intra- and inter- occupational wage differences.

6.5 Decomposing the full- and part-time wage differential : Inter and Intra Occupational Effects

The decomposition of full- and part-time wages for females working in Australia and the United States, identified in equation 6.3, can be extended to account for intra- and inter- occupational effects. This is useful in that previous decompositions have utilised the assumption that occupational attainment is non-discriminatory according to labour force status. Although the previous simulations tested the effect on wages of part-time workers adopting the full-time occupational distribution, no account is made of the attributes of part-time workers which would enable them to achieve this occupational structure. Adopting the methodology identified by Brown, Moon and Zoloth (1980), which represents an extension of the traditional Oaxaca (1973) model, the full- and part-time wage differential can be expressed as

$$\begin{aligned}
 (6.9) \quad \ln \bar{W}^{ft} - \ln \bar{W}^{pt} &= \sum_j p_j^{pt} \left(\hat{\beta}_j^{ft} \bar{X}_j^{ft} - \hat{\beta}_j^{pt} \bar{X}_j^{pt} \right) + \sum_j \hat{\beta}_j^{ft} \bar{X}_j^{ft} (p_j^{ft} - p_j^{pt}) \\
 &\quad \text{(Intra-Occupational)} \qquad \qquad \text{(Inter-Occupational)} \\
 &= \sum_j p_j^{pt} (\hat{\beta}_j^{ft} - \hat{\beta}_j^{pt}) \bar{X}_j^{pt} + \sum_j p_j^{pt} (\bar{X}_j^{ft} - \bar{X}_j^{pt}) \hat{\beta}_j^{ft} + \sum_j p_j^{pt} (\rho_j^{ft} \lambda_j^{ft} - \rho_j^{pt} \lambda_j^{pt}) \\
 &\quad \text{(Wage Decomposition)} \\
 &\quad + \sum_j w_j^{ft} (p_j^{ft} - \hat{p}_j^{pt}) + \sum_j w_j^{ft} (\hat{p}_j^{pt} - p_j^{pt}) \\
 &\quad \text{(Occupational Distribution)}
 \end{aligned}$$

where j represents the occupational categories, \hat{p} represents the proportion of the sample of part-time workers who would be in occupation j if they are

allowed equal occupational choice as full-time workers. Thus the first term of equation (6.9) represents the unexplained components from within occupation wage differences, the second term represents the within occupation wage differences which are explained by the exogenous regressors, the third term represents the sample selection effects, the fourth and fifth term represent explained and unexplained occupational segregation effects, respectively. Since discrimination is often evaluated from the unjustified components of the wage decomposition, it is possible to gain some insight into the effect discrimination has both within and between occupational distributions.¹⁷

To implement equation (6.9), we must estimate a wage equation for each of the eight occupational categories¹⁸ for both full- and part-time workers in both Australia and the United States. The small number in some occupations (particularly the United States part-time salespersons/personal service workers, and plant and machine operators and assemblers) meant the wage equations are not statistically well determined¹⁹. However, this is not a serious problem in this analysis²⁰ since the full-time females is the non-discriminatory basis for comparison, and their wage equations are well defined, along with the model's weighting of occupations according to part-

¹⁷ It is a relatively simple matter to show that the traditional approach to estimating wage discrimination as a special case of this model. In this estimation, the full-time schedule is treated as the base category for evaluation. Sloane (1985) identifies the index number problem associated with this specification.

¹⁸ The estimated equations are provided in Appendix G6.3 and G6.4. The five occupational classifications provided in the CPS data was not used as Kidd (1992) has shown the results in a gender wage context are sensitive to the number of occupational classifications. The occupational grouping of over 800 classifications was redefined into the ASCO standard for this analysis following the standard identified by the International Labour Organisation (1990).

¹⁹ The results from small samples generally accorded with *a priori* expectations. The only exception to this was the results for part-time plant machine operators and assemblers. However, the sensitivity of the final result to this specification was insignificant as a result of the weighting system detailed in equation 6.8, where wage differences are weighted by their proportional representation in occupational groupings.

²⁰ This is discussed in Miller, P.W., (1987), p892 in a gender differential context.

time representation leads to a minimisation of the sensitivity of the final estimates to these effects. The results from applying equation (6.9) are illustrated in Table 6.5²¹.

Table 6.5 : Summary of intra- and inter- occupational effects on the full- and part-time wage differential^(a)

	Australia	United States
Observed differential (ln Wft - ln Wpt)	-0.18	0.27
Decomposition :		
Inter-Occupation	0.04	0.08
Explained	0.01	0.01
Unexplained	0.03	0.07
Intra-Occupation	-0.21	0.19
Explained	-0.15	-0.08
Unexplained	-0.05	0.27

(a) Based upon separate wage equations for full- and part-time workers in each industry for each country after correcting for the trichotomous sample selection model identified in Chapter 4. Discrepancies in totals result from rounding error.

Results for gender wage differentials consistently find the principal cause of wage variation associated with occupation segregation remains unexplained, with most of the unexplained component being from within

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The decomposition was conducted for both trichotomous sample selection and the dichotomous sample selection. Although the dichotomous model's decomposition estimated a higher level of wage differences being explained, the ratio between explained and unexplained components for intra- and inter- occupational wage differences were consistent with the findings of the trichotomous choice model.

occupations²². As shown in Table 6.5, this is also true for the full- and part-time wage differential.

6.6 Conclusions

This chapter compares the occupational effects on wages for part-time workers in two countries - Australia and the United States. This analysis has revealed that occupational segregation does not have a significant effect on female part-time wages in Australia. The effect for the United States is however, significant. Females who work part-time in the United States are found to work in occupations which pay lower rates of pay per hour.

The wage effect associated with Australian working women being subjected to the United States institutional structure is estimated to ascertain the degree to which the existing Australian institutional structure raises part-time wages, relative to their overseas counterparts. It is found that the institutional arrangement in Australia do significantly improve the wages Australian part-time workers receive, and although the United States part-time workers are found to have lower earnings capacity under the Australian institutional arrangements than Australian part-time workers, nevertheless, they would improve their earnings relative to American full-time workers if a more interventionist approach to wage determination is adopted on the United States.

One of the most important policy implications from this chapter relates to the effect non-institutionalised wage bargaining will have upon the earnings of Australian females. This has significant policy implications for Australia at a time when non-institutional based wage bargaining has been placed on the

²² See Miller, P.W.,(1987) for Britain, Brown et.al (1980) for the United States, Dolton, P.J. and Kidd, M.,(1991) for Australia and Hawke, A.E.,(1991) for Australia and the United States.

political agenda. Importantly, will enterprise bargaining decrease female wages? The results of this chapter suggest that if wage bargaining outcomes which exist under the United States' system are implemented in Australia, the wages of Australian females working part-time would fall.

CHAPTER SEVEN

PART-TIME WORK EFFECTS ON THE GENDER WAGE DIFFERENTIAL

7.1 Introduction

Preceding chapters focus on wage differences between females. This chapter extends this work by determining the effect of part-time work on the wage differential between males and females (known as the gender wage differential) in both Australia and the United States. Two important observations encourage the development of the existing methodology for estimating the gender wage differential. Firstly, as noted in the introductory chapters, between 30 and 40 percent of the female workforce in Australia and the United States are on part-time schedules. Secondly, for Australia the part-time pay rates are higher than the full-time rates, whilst the reverse is true for the United States, indicating that inclusion of part-time wages will probably reduce the gender wage differential for Australia and increase the gender wage differential for the United States. The magnitude of these effects will have an important bearing in evaluating the existing methodology for the estimation of the gender wage differential.

7.2 Background

The gender wage differential has remained an important policy issues despite the enactment equal pay and anti-discrimination legislation in both Australia and the United States of America¹. Many studies have attempted to explain the determinants of the average wage differential which exists between

¹ The background and content of these pieces of legislation are discussed in Chapter 2.

men and women². Indeed, the literature has been so extensive on the gender wage differential that Gunderson (1989)³ provides an international comparative study on existing research. However, all major research has been based upon a comparison of full-time earnings (or wages) of males and females. No account is usually made of individuals who work less than full-time hours⁴.

This oversight produces an important problem. That is, where a particular group (in this case, women) are not fully represented in the categories chosen (that is, full-time work) then a source of bias is induced into the analysis. Hence, the estimates commonly used for the gender wage differential will be biased. This chapter estimates the magnitude and direction of the bias for Australia and the United States.

7.3 Methodology

The methodology involved in the estimation and decomposition of the gender wage differential is consistent with that detailed in previous chapters for the full- and part-time wage differential. From Chapter 5, the full- and part-time wage equation for individuals may be restated as

$$(7.1) \quad \ln w_{ft} = X_i' \alpha_i + \rho_{1i} \lambda_{1i} + \varepsilon_{1i}$$

$$(7.2) \quad \ln w_{pt} = X_i' \delta_i + \rho_{2i} \lambda_{2i} + \varepsilon_{2i}$$

² See Bergmann (1974), Fuchs (1971) and Sawhill (1973).

³ Gunderson, M., (1989)

⁴ Some studies which utilise hourly wages do sometimes incorporate part-time workers in the estimation procedure by utilising a part-time dummy variable. Studies, such as Ermisch and Wright (1988) do explicitly incorporate part-time wages into the estimation of an overall gender wage differential. However, this study represents the first attempt to explicitly incorporate part-time work and wages in a comparative study of the Australian and United States gender wage differential.

where i represents males and females, with all other symbols being consistent with previous definitions.

The traditional specification ⁵ of the gender wage differential is represented by the following

$$(7.3) \ln(\bar{w}_{n,m}) - \ln(\bar{w}_{n,f}) = (\hat{\alpha}_{n,m} - \hat{\alpha}_{n,f}) \bar{X}_{n,f} + (\bar{X}_{n,m} - \bar{X}_{n,f}) \hat{\alpha}_{n,m} + (\hat{\rho}_{n,m} \bar{\lambda}_{n,m} - \hat{\rho}_{n,f} \bar{\lambda}_{n,f})$$

(1)
(2)
(3)

where ft indicates the sample is over full-time workers only, m and f indicate males and females respectively. The three terms on the right hand side have a similar interpretation to that described in Chapter 5. The first term represents unexplained differences between males and females. As discussed in Chapter 5, this may reflect differences in productivity, discrimination, and mismeasurement or omission of important explanators of individual's wages.

The second term represents differences in the average wages of males and females which are explained by differences in their measured endowments. That is, this term indicates whether average wage differences result from differences in the average measurable attributes of males and females.

The third term represents differences in the average wages of males and females which result from differences in average sample selection. This term reflects differences in the unobservable characteristics of males and females. The value of sample selection terms is derived from the employment status equations for males and females⁶.

⁵ Based upon the work of Oaxaca (1974) and Blinder (1974).

⁶ The employment status equations from females were reported in Chapter 4. The equivalent estimates for males is provided in the appendix to this chapter.

As noted earlier, this specification ignores the role part-time wage earners have in the labour market⁷. There exists two methods by which part-time wages of males and females can be incorporated into the analysis. First, we may utilise the specification identified in equation 7.3, with parameter estimates and regressors are derived from the part-time wage equation. This specification is identified in equation 7.4.

$$(7.4) \ln(\bar{w}_{pt,m}) - \ln(\bar{w}_{pt,f}) = (\hat{\alpha}_{pt,m} - \hat{\alpha}_{pt,f}) \bar{X}_{pt,f} + (\bar{X}_{pt,m} - \bar{X}_{pt,f}) \hat{\alpha}_{pt,m} + (\hat{\rho}_{pt,m} \bar{\lambda}_{pt,m} - \hat{\rho}_{pt,f} \bar{\lambda}_{pt,f})$$

(1)
(2)
(3)

where all symbols are as previously defined, with the exception that they are now derived from the part-time wage equations. As before, the gender wage differential between part-time workers may be decomposed into three different elements.

The first element, $(\hat{\alpha}_{pt,m} - \hat{\alpha}_{pt,f}) \bar{X}_{pt,f}$ represents the differences in the coefficients of the full- and part-time equations, weighted by the mean of the part-time workers endowments vector. As for the full-time decomposition, this element represents differences in productivity and discrimination, or mismeasurement or omission of important variables which influence wages. Again, the exact contributions of these factors to the wage differential remains unexplained.

The second element, $(\bar{X}_{pt,m} - \bar{X}_{pt,f}) \hat{\alpha}_{pt,m}$ represents the differences in the average level of endowments between males and females working part-time, weighted by the coefficients from the male equation. This elements represents the endowment effect.

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In some studies part-time workers are incorporated into the analysis by the introduction of a part-time dummy variable. The problems associated with this approach have been discussed in previous chapters.

The third element, $(\hat{\rho}_{pt,1m}\bar{\lambda}_{pt,1m} - \hat{\rho}_{pt,1f}\bar{\lambda}_{pt,1f})$ represents the differences between the sample selection effects of the male and female part-time wage equations. That is, this term measures the difference in unobservable factors such as worker quality which influence the wages of males or females working part-time. The estimate for the sample selection term lambda is derived from the employment choice equations reported in appendix H7.1, H7.2 for males and Tables 4.5 and 4.7 for females.

As is discussed in Chapter 5, apportioning differences in wages to endowments, sample selection and unexplained differences requires three relatively strong assumptions. The first assumption is that all factors which affect productivity differences are included in the regression equation. Second, all variables used as explanators are measured without error, which includes not only the reliability of the estimates but also functional form and an appropriate error structure. Thirdly, in any analysis of sample selection, it is assumed that the factors which proxy the underlying causes of non-random selection are accurately determined.

The specification in equation 7.4 whilst identifying a gender wage decomposition for part-time workers does not allow us to identify the overall effect⁸ on wage differences between males and females of including part-time workers. In order to identify the overall gender wage differential two separate effects require identification before a meaningful measure of the overall gender wage differential is achieved. These effects refer to the share of part-time employment and level of relative part-time wages.

⁸ The term overall gender wage differential is intended to represent the wage differential between males and females which results from explicitly including full- and part-time wages in the analysis.

The share of part-time employment represents the proportion of the group (in this case males or females) employed in part-time work relative to full-time work. The level of relative part-time wages refers to the hourly wage differences between males and females working part-time relative to their full-time counterparts.

The importance of these factors is best understood by stylising the role of full- and part-time work and wages in Australia and the United States. We know from the analysis of Chapter 4 and 5, that for Australia and the United States the majority of employed males work full-time. Although the majority of employed females work full-time, part-time work employs a significant proportion of working females. Additionally, we observe for Australia, a part/full-time wage ratio of greater than 1, and for the United States this ratio is estimated to be less than 1. To estimate an overall gender wage differential, differences in wage levels between males and females working full- and part-time need to be weighted by their employment share in these states.

Algebraically we may state the overall gender wage differential as

$$(7.5) \text{ GWD} = (p_{ft,m} \cdot \bar{W}_{ft,m} - p_{ft,f} \cdot \bar{W}_{ft,f}) + (p_{pt,m} \cdot \bar{W}_{pt,m} - p_{pt,f} \cdot \bar{W}_{pt,f})$$

where p represents the proportional representation of the group, ft and pt represent full- and part-time respectively, m and f represent male and female respectively, and W represents the log of hourly wages. Thus, equation 7.5 represents the weighted mean of the gender wage differential for full- and part-time workers.

From the decompositions of equations 7.3, 7.4 and 7.5, four important empirical outcomes for Australia and the United States can be evaluated. First, it is possible to ascertain the comparability of the estimates of this

study's full-time gender wage differential with other reported studies. This process allows us to frame the following work within the existing, well-developed literature.

Second, using the methodology utilised in evaluating the full-time gender wage differential, it is possible to estimate the gender wage differential between part-time workers. Although part-time work is not a dominant labour market activity for males, in estimating the gender wage differential for part-time workers it is possible to determine whether the wage advantage which is evident from most full-time studies applies equally for part-time workers.

Third, using equation 7.4 the respective roles of endowments, sample selection and unexplained differences⁹ in full- and part-time wage differences of males and females in Australia and the United States is estimated. In this aspect of the analysis, the relative contribution of unexplained effect to the wage differential between males and females both within full- and part-time work and between Australia and the United States is gauged. If this effect reflects the extent of relative discrimination (which is the interpretation placed upon this effect by Gregory *et. al.*(1985, 1986) among others), given Australia's institutional arrangements, it is hypothesised this effect will be smaller for part-time workers in Australia when compared to the United States.

Fourth, it is possible to evaluate the sensitivity of the traditionally measured gender wage differential to the explicit incorporation of part-time workers in to the analysis. This sensitivity is gauged by comparing the full-time gender wage differential with the estimate of the overall gender wage differential identified in equation 7.5. Hence, this analysis provides some

⁹ As discussed in Chapter 2, attributing the differences in coefficients to capturing an actual estimate of discrimination is problematic. However, it is common in discrimination literature (see Gregory *et.al.* (1985), Miller (1987)) as attributing the extent of this factor of being indicative of discrimination.

indication of the accuracy of existing gender wage studies. The results also allow an interpretation of the impact of institutional arrangements on the gender wage differential.

7.4 Wage equation results for males

To complete the decompositions identified by equations 7.3 and 7.4 it is necessary to estimate the male employment and wage equations for Australia and the United States. Appendices H7.1 and H7.2 report the results from the male employment status equations for Australia and the United States, respectively¹⁰. The comparable estimates for females in both countries are reported and discussed in Chapter 4. Tables 7.1 and 7.2 report estimates of the equations which explain full- and part-time wages for males in Australia and the United States. Comparable estimates for females are previously provided in Chapter 5.

Three issues are identified for these wage equations. First, how do males working full-time compare with males working part-time¹¹? Second, is there a difference in the magnitude of the effect of a change in the human capital characteristics between countries? Third, how do the results from the male equations compare to the female equation results? Each of these issues is discussed sequentially.

The findings from Table 7.1 suggest for Australia, educational qualifications is not associated in a statistically significant way with changes in the wages of males working part-time in 1986. However, consistent with most other studies, education is estimated to be a significant determinant of

¹⁰ The definitions and methodology of the employment status equations are consistent with those employed for females in Chapter 4. The trichotomous specification for employment status was used to estimate the sample selection term.

¹¹ The comparison of female wage equation results was undertaken in Chapter 5.

male full-time wages. Tertiary-educated males working full-time are estimated to earn approximately 28 percent more than males without formal qualifications. This estimate is lower than that reported for comparable studies. However, consistent with *a priori* expectations, the increasing returns to education are associated with increased education.

The estimates detailed in Table 7.1 indicate the male part-time wage equation is poorly specified (with only 8 percent of the variation around the mean of the dependent variable being explained by the regression), whilst the

TABLE 7.1 : Male wage equations, Australia
Ordinary least squares regression, (corrected standard errors)

Variable	Part-time		Full-time	
	Coefficient	t-ratio	Coefficient	t-ratio
Constant	2.447	1.367 *	1.496	9.250 *
MURBAN	-0.122	-0.067	0.304	6.619 *
URBAN	-0.138	-0.092	0.242	6.272 *
ED2	-0.227	-0.188	0.063	2.020 **
ED3	-0.175	-0.093	0.209	4.434 *
ED4	0.291	0.140	0.284	5.588 *
EXP	0.037	0.341 ***	0.014	3.770 *
EXP2	-0.001	-0.715 ***	0.000	-5.074 *
RACE	0.738	0.164	-0.202	-1.526
OCC2	-0.386	-1.453	0.132	3.373 *
OCC3	0.134	0.223	0.012	0.295
OCC4	-0.338	-1.210 ***	-0.151	-4.631 *
OCC5	-0.266	-0.759	-0.070	-1.734 ***
OCC6	-0.574	-1.407 **	-0.118	-2.842 *
OCC7	-0.120	-0.387	-0.144	-3.974 *
OCC8	-0.422	-1.337 **	-0.210	-6.133 *
GOVT	0.107	0.521	0.136	7.015 *
MARRIED	-0.191	-0.068	0.205	3.032 *
DIVORCE	0.433	0.220	0.085	1.571
LAMBDA	-0.468	-0.110	0.342	1.723 ***
Observations		209		1787
Mean of LHS		2.566		2.258
Adjusted R-squared		0.082		0.263
F[19, n-20]		1.979		34.577
Dep. Var. = lnw _{hr}				

TABLE 7.2 : Male wage equations, United States

Ordinary least squares regression, (corrected standard errors)

Variable	Part-time		Full-time	
	Coefficient	t-ratio	Coefficient	t-ratio
Constant	1.144	3.543 *	1.145	17.134 *
CITY	0.109	0.921	0.103	4.221 *
MSA	0.327	3.001 *	0.206	9.920 *
ED2	0.379	2.081 **	0.297	8.694 *
ED3	0.580	2.866 *	0.410	10.430 *
ED4	0.967	4.688 *	0.595	14.383 *
EXP	3.31E-02	2.359 *	0.044	14.084 *
EXP2	-6.25E-04	-2.162 **	-0.001	-11.190 *
RACE	-0.170	-1.147	-0.106	-3.470 *
OCC2	-0.189	-0.718	-0.057	-1.631 ***
OCC3	-0.474	-1.865 ***	-0.049	-1.469
OCC4	-0.207	-0.761	-0.163	-3.687 *
OCC5	-0.3554	-1.407	-0.346	-8.212 *
OCC6	-0.262	-1.028	-0.388	-9.867 *
OCC7	-0.187	-0.655	-0.043	-1.361
OCC8	-0.113	-0.409	-0.107	-3.067 *
GOVT	-4.14E-03	-0.029	0.068	2.565 *
MARRIED	0.277	1.536	0.305	8.736 *
DIVORCE	0.363	1.499	0.239	5.690 *
LAMBDA	0.2273	2.342 *	0.111	2.433 *
Observations		384	4316	
Mean of LHS		1.720	2.285	
Adjusted R-squared		0.136	0.270	
F[19, n-20]		4.160	85.186	
Dep. Var.		lnwhr	lnwhr	

male full-time equation is significant at the 1 per cent level and explains approximately 26 per cent of the variation. These results indicate that although human capital would appear to provide some important explanations regarding the factors which affect the wages of males, other factors remain unexplained by the regressions are also important.

The *a priori* hypotheses regarding experience and experience squared predict that increasing the level of experience increases the wages of an individual, but at a decreasing rate. Hence, it is predicted that the coefficient on the experience term is positive, that is, $exp > 0$, and the coefficient in the experience squared term is negative $exp^2 < 0$. These expectations are

consistent with the reported results, with experience and experience squared being significant in full- and part-time equations.

The full-time result is consistent with other studies utilising Australian wage data. Since this study is the first to separately estimate a wage equation for part-time workers no comparison of these results is available. As is found for the female wage equations, the returns to experience for males are higher in the part-time market than the full-time market. Each additional year of schooling is predicted to add 3.7 percent to the hourly wage of part-time workers, but only 1.4 percent to the hourly wage of full-time workers.

Two considerations affect this result. First, as for the female wage equations, the experience term does not account for interrupted spells of work. Second, the experience term treats a year in full-time employment as being equivalent to a year in part-time employment. Hence the estimate of experience for part-time workers is expected to be upwardly biased. Given the number of interrupted spells of work are less for males than females (on average), the bias should be smaller for the male experience estimate than for females. However, the extent of the bias remains undetermined.

The dummy variable which represents whether an individual's employer is federal, state or local government (GOVT), although not significant in the part-time wage regression, is significant at the 1 per cent level in the full-time equation. The estimated additional wage effect of being a government employee is estimated to be 14 per cent in the full-time equation for males in Australia. The lack of significance of the government variable in the part-time wage equation is surprising in that there exists several government policies, including flexi-time and paternity leave, which are aimed at assisting both males and females with their child rearing responsibilities.

For the United States, Table 7.2 provides evidence indicating the human capital model fits the United States data for working males better than comparable Australian data . The returns to education in both full- and part-time equations increase with the level of education. These estimates are estimated to be higher for the United States than Australia. However, the cell size of some variables is small. This in part explains the estimate on the tertiary qualifications variable (ED4), where males in the part-time employment are estimated to earn wages that are 97 percent higher than comparable unqualified males.

The returns to experience for males in the United States differ between labour market states. The returns to experience for males working part-time are estimated to be significantly lower than in the full-time sector (0.00331 compared to 0.044 for each additional year of experience). Thus, the returns to experience between full- and part-time work have the reverse order of magnitude between Australia and the United States.

As a result of the relative importance of human capital factors in explaining the wages of males working part-time in the United States, the equation is significant at the 1 percent level of significance, with almost 14 percent of the variation being explained by the estimated regression. The occupational and marital status dummy variables are not found to be statistically significant explanators of the wages of males working part-time in the United States at conventional levels of significance. Demographic and human capital factors are however, found to be significant at the 1 and 5 percent levels of significance¹².

¹² The variable CITY being an exception.

In the full-time wage equation for males in the United States, all variables except two occupational dummies are estimated to be significant. That is, virtually all the demographic, educational, occupational and sample selection terms are estimated to be statistically significant in explaining the wages of males working full-time. Except for the variable (OCC2), which is significant at the 10 per cent level, the level of significance for the other significant variables is at the 1 per cent level.

Third, comparing the results of Tables 7.1 and 7.2 with the results reported in Tables 5.4 to 5.7 provides a basis to compare results for males and females both within and between countries. This is the primary advantage of having comparable estimates across countries. For Australia, the model performs relatively poorly in explaining part-time wages of both males and females. Overall, however, it is statistically significant. One explanation for the lack of significance in the human capital variables is the institutionalised wage structure employed in Australia. The aspects of the institutional wage determination and award system are discussed in Chapter 3. In Australia, wages for part-time workers are institutionally determined to be at least equal to the hourly rate payable to full-time workers undertaking comparable jobs. Comparable estimates for the full-time wage equations for males and females demonstrate that, consistent with other studies¹³, human capital does explain with a high degree of significance the wages of individuals in full-time work. Hence, the difference in the degree of explanatory power of human capital in explaining the wages of full- and part-time workers may indicate that the full-time wage is affected by market forces to a greater extent than part-time wages.

¹³ See for example Chapman, B., Mulvey, C., (1986)

However, despite their insignificance at the 1 and 5 percent level, wages for part-time workers do increase in magnitude with increases in the level of education. Whilst it is impossible to assign any degree of significance to the part-time coefficients, it is interesting that the results to education in part-time work are lower for males than females. For full-time workers, the conventional result that the returns to education are higher for males than females are indicated in Table 7.1. Additionally, consistent with this finding, experience is also estimated to effect wages at a higher rate for males than females. Whilst marriage is found to be a significant determinant of the wages of males working full-time, only divorce is estimated to be significant for females.

For the United States, the results from Tables 7.2, 5.6 and 5.7 indicate education and experience are important determinants of the wages males receive in the full-time market, with the exception of tertiary qualifications, they are not significant in the female part-time wage equations. Unlike Australia, the returns to education are much lower for females than males in part-time work. For tertiary qualified individuals, these differences when compared to the unqualified, represent a 97 percent wage return for males compared to a 37 per cent return for females. As noted earlier however, the estimates for tertiary-educated males in the part-time labour market should be viewed with some caution as a result of relatively small cell sizes. Recalling the discussion on observed wages and the interpretation of the sample selection effects in Chapter 5, the differences in the signs on the sample selection terms between the males and females part-time wage equations indicate that for males, relative to the rest of the population, those working part-time are negatively selected in the United States, but randomly selected in Australia.

In the full-time labour markets, the estimated regression results for males and females are both significant at the 1 percent level. The full-time wage regression equation for males in the United States explains 27 percent of the variation in wages compared to approximately 20 percent for comparable females.

For the United States the differences in the returns to high school qualifications for males and females respectively (compared to the unqualified), are 30 percent compared to 15 percent. For those individuals with post-school qualifications, the magnitude of the difference is identical to those with high school qualification (42 percent compared to 26 percent). For both males and females the returns to education of post-school qualification are higher than for those with high school qualifications. For tertiary educated males and females, the difference in their returns to education are 60 percent compared to 48 percent.

The race dummy variable identifies the differential wages paid to individuals who white and non-white, *ceteris parabus*. The estimation for males in the United States working full-time suggests non whites are paid approximately 11 percent less than their white counterparts, no evidence of a statistically significant relationship in the part-time labour market is found. Although the result for males working full-time has been found in most other studies, it is surprising not to find a similar relationship for females working full-time.

The occupational variables provide the opportunity to gauge in a consistent framework¹⁴ the relative importance of occupations to the wage

¹⁴ Although Chapter 6 analysed the importance of understanding the implicit underestimation in the utilising the existing occupational structure, the results from incorporating occupational dummies in a wage equation are utilised here in order to be consistent with the treatment of male occupational structures.

outcomes of males and females. Generally, as for most other significant variables, males receive a higher return to particular occupational classifications than females.

This section has compared the regression results for males and females who work full- and part-time in Australia and the United States. However, the information contained in the means of these variables has not been utilised to ascertain the respective importance of endowments, sample selection and productivity factors in explaining the wage differences between males and females. The following section attempts to determine the relative importance of these factors.

7.5 Results from the decomposition of the gender wage differential

The early sections of this chapter noted the gender wage differential is most commonly estimated for full-time workers. Equation 7.3 identified this specification of the gender wage differential. Using the results of Tables 7.1 and 7.2, the gender wage differential for Australian full-time workers is estimated to be 24 percent. For the United States, the comparable statistic is 36 percent.

In Chapter 2, Tables 2.1 and 2.2 recent estimates of the full-time gender wage differential are provided. For Australia, estimates of the gender wage differential range from around 15 to 25 percent. For the United States, the gender wage differential for full-time workers is estimated to be around 34 percent. Thus, the gender wage differential provided in this analysis is consistent with recent reported estimates in Australia and the United States.

As identified in equation 7.3, the gender wage differential for full-time workers may be decomposed into three separate components. The first component, $(\hat{\alpha}_{f,m} - \hat{\alpha}_{f,f}) \bar{X}_{f,f}$ represents differences in the average

wages males and females working full-time receive, which is not explained by the regression equations. The results for Australia suggest unexplained factors reduce the difference between the wages of males and females by around 15 percentage points. This result differs from other reported studies for Australia, such as Chapman and Miller (1987) and Jones (1983) estimated the unexplained effects (which they attribute to discrimination) increase the gender wage difference by between 8.5 and 14 percentage points. One reason for the difference between studies of the contribution unexplained factors have in the determination of the gender wage differential is the regressors used in the wage equations. One important difference between this study and the Chapman and Miller (1987), Jones (1983) studies is the inclusion of sample selection. An alternative estimate of this effect using non-selection adjusted equations, produced a results which indicated unexplained differences contributed to around an 18 percent increase in the gender wage differential for full-time workers.

For the United States, the effect of unexplained factors on the gender wage differential of full-time workers is estimated to be 13 percentage points. This suggests that, as a result of factors including productivity and discrimination differences, females in the United States receive wages 13 percent lower than comparable males.

Four conclusions may be drawn from these results. First, estimates of the inclusion of a sample selection terms does affect the magnitude of the unexplained effect in the gender wage differential. Second, results from this study are consistent with those reported in other recent Australian studies. Third, caution must be exercised is attributing the unexplained effect to discrimination as a result of the sensitivity of this estimate to the specification of the model. Four, for Australia, unexplained factors are estimated to reduce

the wage differences between males and females, whilst for the United States, these factors are estimated to increase the gender wage differential for full-time workers.

The second component of the full-time gender wage differential identified in equation 7.3, $(\bar{X}_{ft,m} - \bar{X}_{ft,f}) \hat{\alpha}_{ft,m}$ represent endowment effects. For Australia, differences in the measurable characteristics of individuals are estimated to increase the gender wage differential by only 2 percent. For the United States, measurable characteristics contributed to a 5 percent increase in the gender wage differential.

Therefore, in Australia factors other than human capital appear to be important in the explanation of wage differentials between males and females, and females working full- and part-time. For the United States, whilst human capital is slightly more important in the explaining the gender wage differential of full-time workers than for Australia, the overall importance of human capital in explaining the gender wage differential is relatively small. This relationship is also evident in the wage differential analysis of females working full- and part-time conducted in Chapter 5. In Chapter 5, endowment effects are estimated to increase the wage differential between full- and part-time workers by 13 percent, yet endowment effects contributed the smallest component to the average wage differential between full- and part-time workers.

The third component of the gender wage differential for full-time workers, $(\hat{\rho}_{ft,m} \bar{\lambda}_{ft,m} - \hat{\rho}_{ft,f} \bar{\lambda}_{ft,f})$ represents differences wages between males and females which result from differences in sample selection. For Australia, sample section contributed to a 36 percent increase in the wage differential between males and females. For the United States, the

contribution of sample selection effects to the gender wage differential of full-time workers is estimated to be 19 percent. These results indicate that unobservable differences between males and females (such as initiative, motivation, dedication to a career and perceptions of how family responsibilities change labour market performance) are estimated to be the primary explanation for the wage differential between males and females who worked full-time.

Utilising the specification identified in equation 7.4, it is possible to estimate the gender wage differential for part-time workers in Australia and the United States. For Australia, the gender wage differential for part-time workers is estimated to be 37 percent. For the United States, the gender wage differential for part-time workers is estimated to be 11 percent. Thus, the magnitude for the gender wage differential of part-time workers in Australia exceeded the full-time gender wage differential by 13 percentage points. For the United States, the gender wage differential for part-time workers is estimated to be 25 percentage points lower than the full-time estimate.

For Australia, as is found for the full-time decomposition of the gender wage differential, differences in average sample selection are estimated to be the primary cause for the gender wage differential between males and females working part-time. Unexplained differences between males and females working part-time are estimated to increase the wage differential by 16 percent. Endowment differences between males and females working part-time are estimated not to contribute to the part-time gender wage differential.

For the United States, unlike Australia, sample selection is the least important factor in explaining wage differences between males and females working part-time. It is estimated that differences in unobservable characteristics led to an 11 percent reduction in the part-time gender wage

differential. Distinguishing the part-time result from the Australian results is the estimate that differences in measurable characteristics of males and females contribute towards an 18 percent reduction in the gender wage differential of part-time workers. That is, females working part-time in the United States had human capital characteristics which exceeded those of their male counterparts, thereby contributing to an 18 percent reduction in the gender wage differential of part-time workers. Unlike the Australian full- and part-time markets, and the United States full-time market, human capital is found to be an important explanation in determining the cause of the wage differential between males and females working full-time. The most important contribution to the gender wage differential between part-time workers in the United States is estimated to result from factors which are unexplained by the wage equations. Only the unexplained component contributes towards increasing the wage differential between males and females working part-time. If this component is interpreted as providing some indication of discrimination, then it would appear that discrimination against females in the United States part-time labour market is much more significant than is observed for females in full-time work.

Until now, a gender wage differential has been separately estimated for the full- and part-time markets. The estimates of the gender wage differential for full-time workers are consistent with other studies. For Australia, a gender wage differential of 24 percent is estimated. For the United States, the estimate is 36 percent. For part-time workers in Australia, the gender wage differential is estimated to be 37 percent. For the United States, a comparable estimate is 11 percent. Although some indication of gender wage differences for each of these markets is useful to understand, it is the overall gender wage

differential which allows the comparison of the relative wages of males and females.

**TABLE 7.3 : Gender wage differential summary table,
Australia and the United States (a)**

	Per cent (b)	
	Australia	United States
Full- time differential		
TOTAL (c)	0.24	0.36
Unexplained	-0.15	0.13
Endowment	0.02	0.05
Selectivity	0.36	0.19
Part- time differential		
TOTAL (c)	0.37	0.11
Unexplained	0.16	0.39
Endowment	0.00	-0.18
Selectivity	0.21	-0.11
Weighted gender wage differential (d)		
TOTAL (c)	0.19	0.40

(a) Estimates based upon the trichotomous sample selection adjusted wage equations

(b) Based upon the differences in log earnings

(c) Subject to rounding error

(d) Estimated from the specification identified in equation 7.5. The weighting are based upon the number of observation for each group as reported in their respective wage equations.

Equation 7.5 represents a gender wage differential for full- and part-time workers when account is made for the difference in the level of hourly wages between full- and part-time workers and the share of part-time employment for males and females. Since for Australia, part-time hourly wages exceed full-time hourly wages, it is expected that the inclusion of part-time hourly wages into an estimation of the overall gender wage differential

would decrease the gender wage differential from that observed for full-time workers. For the United States, part-time hourly wages are observed to be lower than full-time hourly wages. Hence the expectation is that incorporating part-time hourly wages into the analysis is expected to increase the gender wage differential from that observed for full-time workers.

For Australia, the overall gender wage differential is estimated to be 19 percent. This represents a reduction in the estimate gender wage differential of 5 percentage point from the traditional measure utilising full-time workers only. For the United States, the overall gender wage differential is estimated to be 40 percent. This represents a 5 percentage point increase in the estimate of the gender wage differential which utilised full-time workers only. Thus, for both Australia and the United States, the explicit inclusion of part-time employment share and relative wages has an important implications for the size of the overall gender wage differential.

This analysis focussed upon the share of employment and level of wage differences with Australia and the United States. One advantage of a two country approach is that it is possible to draw inferred on predicted outcomes given the observed relationship in the other country. In preceding chapters, the important of centralised wage bargaining in Australia and the relatively free-market of the United States to wage outcomes are discussed. This and preceding chapters have analysed the wage ratios between males and females, and full- and part-time workers. Utilising these findings it is possible to estimate some of the wage implications for Australian workers if the observed wage outcomes in the United States applied.

From Tables 5.4, 5.5, 7.1 and 7.2 we can observe that males who work full-time in the United States earn over 60 percent more per hour than females working part-time. For Australia, the male full-time hourly wage is estimated

to exceed the female part-time hourly wage by around 5 percent. The implications of this differential to Australia females working part-time is quite large.

The effect on the average part-time weekly wage for Australian females is estimated by assuming the wage relativities between male full-time workers and female part-time workers observed in the United States applied. In 1986, the average number of hours worked per week for male wage and salary earners in Australia is 38.4 hours. The average weekly ordinary time earnings for non-managerial adult male full-time workers is \$399.30¹⁵. This implies that the basic hourly wage for males working full-time in 1986 is around \$9.90 per hour.

Given that United States females working part-time are estimated to earn 60 percent less than male full-time workers, and the Australian differential between these groups is estimated to be 5 percent, it is interesting to compare the effect of these differing ratios on the gross weekly wage of females working part-time in Australia. The difference between the outcome from a wages system which imposes the relativities observed in the United States and Australia's centralised system will be \$84.32 per week assuming females working part-time do so for 15.5 hours per week, which is the average for 1986. That is, if we assume that the United States differential may be solely attributed to the free-market system of industrial relations, and the Australian differential results from the relatively centralised system of wage bargaining, then the impact of free-market wage bargaining on Australian females working part-time is to more than halve their gross weekly wage.

¹⁵ Estimates from ABS (1987), Labour Statistics, Australia, Catalogue No. 6101.0, Table 6.6 and 8.1

7.6 Conclusions

This chapter contained five objectives. The first objective, to estimate the gender wage differential as conventionally measured, and then compare the results with other studies reported in Chapter 2. Utilising the results reported in Tables 2.2, 2.3 and 7.3, the estimate of a 24 percent gender wage differential for Australia and a 36 percent gender wage differential for the United States for full-time workers is found to be consistent with recently reported estimates from other studies.

The second objective, to estimate the gender wage differential for part-time workers, is then undertaken. Although no comparable estimate for Australia are available, this study finds a 37 percent gender wage differential for part-time workers. For the United States, the part-time gender wage differential is estimated to be smaller at 11 percent. One reason for the relatively small gender wage differential for United States workers on part-time schedules is estimated to be the role of endowments. The endowment effect for this group reduced the wage differential between males and females by 18 percent. This effect offset the unexplained component of the gender wage differential for part-time workers in the United States of 39 percent.

The third objective, to estimate the respective effects of endowments, sample selection and unexplained differences in explaining the wage differential between males and females used the regression results reported in Tables 5.4, 5.5, 7.1 and 7.2. Table 7.3, the summary table of these results, indicates that for part-time workers in the United States, the largest component in the wage differential between males and females is unexplained by the regression. Although this reflects differences in coefficients rather than discrimination *per se*, it may be interpreted as providing some indication that

the degree of discrimination against females in the United States is higher than in Australia.

The fourth contribution of this chapter is to understand the sensitivity of the explicit inclusion of part-time workers into the gender wage analysis on the overall gender wage differential. Unlike Ermisch and Wright (1988) who find including the remuneration for full- and part-time jobs into the estimation of the gender wage differential contributes only a small amount (1-3 percentage points of the differential)¹⁶ to the overall gender wage differential, the results from this chapter suggest the magnitude of the effect for Australia and the United States is much larger. For Australia, it is estimated that including the gender wage differential of part-time workers into the estimate of an overall gender wage differential lowers the full-time gender wage differential by 5 percentage points. For the United States, including the part-time gender wage differential into an estimate of the overall gender wage differential increases the full-time gender wage differential by 4 percentage points.

Finally, using the male/female wage relativities from the United States in an Australian analysis, it is predicted that the gross weekly wage Australian females would more than halve if the current system of centralised wage bargaining is replaced by a system similar to that found in the United States.

Two points appear to follow from the general findings of this chapter. Firstly, the Australian institutionally based wage bargaining system appears to produce a smaller average wage differential between males and females than the relatively free-market system of the United States. Secondly, based upon the results in this chapter, the removal of the Australian institutionalised wage

¹⁶ Ermisch and Wright (1988) adjusted a raw gender wage differential by a weighted wage differential between females working full- and part-time.

bargaining system to one similar to that operating in the United States is predicted to not only decrease the wages of part-time workers but also lead to an increase in the relative degree of discrimination against females relative to males.

CHAPTER EIGHT

CONCLUSIONS

8.1 Overview

This thesis investigated the wage differentials between females working full- and part-time in Australia and the United States and the effect these differentials have on the aggregate ratio of female to male wages in both countries. The thesis contributes to existing knowledge in three ways. Firstly, it documents the magnitude and sign of the male/female wage ratio and the full/part-time wage ratio for countries which include Australia and the United States. Existing international empirical evidence was provided to support the finding of average male wages per hour exceeding average female wages per hour. International comparisons of the wage differential between full- and part-time workers find the average wage per hour of full-time workers exceeds that of part-time workers. However, for Australia part-time hourly wages were estimated to exceed full-time hourly wages by around 20 percent.

Secondly, this thesis draws upon the theories of human capital, segmented labour markets and efficiency wage to develop a model which explains individual's wages. From this model, the roles of human capital, sample selection, occupations and institutions in determining the wage differential between full- and part-time workers was estimated. For Australia, differences in the endowments were not found to be an important factor in determining the causes of the wage differential between full- and part-time workers. For the United States, however, differences in the level of endowments were estimated to be important in explaining the wage differential between females working full- and part-time. Sample selection effects were estimated to be important in explaining the wage differential

between females working full- and part-time in both countries. This effect was interpreted as indicating that in Australia, higher hourly wages are inducing 'better' quality workers into the part-time labour market. Unexplained differences (such as discrimination and productivity differences) were also found to be important in explaining the wage differential between females working full- and part-time in the United States, but not in Australia. This finding lead us to examine the role of occupations and institutions in explaining the full- and part-time wage differential.

For the first time, an analysis of the occupational distribution of workers was predicted on the basis of equal occupational entry irrespective of work force status. The findings of this work produced several empirically based conclusions. Firstly that the occupational distribution of part-time workers is more dense than full-time workers. However, occupational segregation was relatively unimportant factor in explaining the wage differential of females working full- and part-time in Australia. Contrasted to this, it was estimated that occupational segregation did have a significant impact on the wage differential between full- and part-time workers in the United States.

Evidence was found to support the proposition that the existing Australian institutional structure significantly improves the wages Australian part-time workers receive, and although the United States part-time workers were found to have lower earnings capacity under the Australian institutional arrangements than Australian part-time workers, nevertheless, they were predicted to improve their earnings relative to American full-time workers if a more interventionist approach to wage determination was adopted in the United States.

Thirdly, since part-time work was demonstrated to be of particular importance for females, and wages from part-time work were estimated to exceed full-time wages in Australia but be lower than full-time wages in the United States, the effect of part-time work and wages on the overall wage ratio between males and females was examined. The full-time gender wage differential of 24 percent for Australia and 36 percent for the United States was found to be consistent with other recent studies. For the first time, a gender wage differential for part-time workers was estimated for Australia. The gender wage differential for part-time workers in Australia was estimated to be 37 percent whilst for the United States, the estimate was 11 percent. These results were then used to construct an estimate of the overall gender wage differential for Australia and the United States. For Australia, including part-time workers explicitly into the gender wage analysis decreased the gender wage differential estimate derived for full-time workers by 5 percentage points to 19 percent. For the United States, explicitly including part-time workers into an estimate of the gender wage differential increased the estimate from the full-time gender wage analysis by 4 percentage points to 40 percent.

This thesis has touched on a wide range of issues relating to the relative wages of males and females working full- and part-time. The comparison between Australia and the United States enabled an increased understanding of common themes which impact upon the relative wages of individuals, as well as factors which lead to differences between countries. It could be expected that the magnitudes of these wage differences have some impact upon a range of other factors such as the fertility rate and family formation. Future research should include an explicit analysis of the impact differences in relative wages of individuals between and within countries have upon these factors.

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APPENDIX A : Australian data definitions
Derived from the 1986 Housing and Population Survey

Education Variables

- ed1** : unqualified, age on leaving school was less than or equal to 15;
no further qualifications
ed2 : high school, age on leaving school was greater than 16, and had
achieved some form of high school certificate
ed3 : post secondary, trade certificate or diploma
ed4 : degree, completion of at least a bachelor's degree or graduate diploma

Experience

- exp** : age minus age left school (exp constrained to be non-negative)
exp2 : experience squared

Area

- urban** : living in a major urban area
urban : living in an urban community
rural : living in rural area

Marital status

- married** : currently married, spouse present
divorced : separated, widowed or divorced
single : never married

Occupational Classifications

- occ1** : managers and administrators
occ2 : professionals
occ3 : para-professionals
occ4 : tradespersons
occ 5 : clerks
occ6 : salespersons and personal service workers
occ7 : plant and machine operators and drivers
occ8 : labourers and related workers

Industries

ind1 : agriculture, forestry, fishing, hunting

ind2 : mining

ind3 : manufacturing

ind4 : electricity, gas, water

ind5 : construction

ind6 : wholesale, retail trade

ind7 : transport, storage

ind8 : communication

ind9 : finance, property, business services

ind10 : public administration, defence

ind11 : community services

ind12 : recreational, personal services

Other Categories

govt : dummy for employees

yinc : other income (including spouse's income) /1000

kidn : number of dependant children

lnwhr : log of hourly wages

APPENDIX B : United States data definitions
Derived from the 1987 Current Population Survey

United States

Education Variables

unqualified : completed less than 4 years of high school

high school : completed 4 years of high school

post secondary : completed 1 to 3 years of college

degree : completion of at least a 4 years of degree

Experience

exp : age minus age left school (exp constrained to be non:negative)

exp2 : experience squared

Area

city : lives in major metropolitan area

msa : lives in metropolitan statistical area

rural : lives in either non-msa or rural area

Marital status

married : currently married spouse present

divorced : separated, widowed or divorced

single : never married

Occupational Classifications

occ1 : managers and administrators

occ2 : professionals

occ3 : technical and associated professionals

occ4 : crafts and trades workers

occ5 : clerks

occ6 : salespersons and personal service workers

occ7 : plant and machine operators and assemblers

occ8 : labourers and related workers

Industries

ind1 : agriculture, forestry, fishing, hunting

ind2 : mining

ind3 : manufacturing

ind4 : electricity, gas, water

ind5 : construction

ind6 : wholesale, retail trade

ind7 : transport, storage

ind8 : communication

ind9 : finance, property, business services

ind10 : public administration, defence

ind11 : community services

ind12 : recreational, personal services

Other Categories

govt : dummy for government employees

yinc : other income / 1000

kidn : number of dependant children

lnwhr : log of hourly wages

APPENDIX C : Derivation of the variance-covariance matrix for the wage equations when $\hat{\lambda}$ is a regressor¹

We may restate the wage equation(s) as

$$W = X'\beta + \varepsilon_w$$

and after correcting for selection bias, this becomes

$$W = X'\beta - \sigma_{wu}\lambda + \varphi$$

where $\varphi = \varepsilon_w + \sigma_{wu}\lambda$

Since λ is not observed, $\hat{\lambda}$ is constructed using $\hat{\varphi}$ from the participation equation. Thus,

$$W = X'\beta - \sigma_{wu} \hat{\lambda} + \hat{\varphi}$$

where

$$\hat{\varphi} = \varphi + \sigma_{wu} (\hat{\lambda} - \lambda)$$

and

$$\hat{\lambda}_i = \frac{\phi(Z_i'\varphi)}{\Phi(Z_i'\varphi)} = f_i(\hat{\varphi})$$

Z represents the matrix of explanators from the participation equation.

Expanding equation (6a) gives

$$f_i(\hat{\varphi}) = f_i(\varphi) + f_i'(\varphi) \cdot (\hat{\varphi} - \varphi)$$

$$f_i(\hat{\varphi}) - f_i(\varphi) = f_i'(\varphi) \cdot (\hat{\varphi} - \varphi)$$

$$\hat{\lambda}_i - \lambda_i = \lambda_i'(\varphi) \cdot (\hat{\varphi} - \varphi)$$

$$\hat{\lambda}_i'(\varphi) = \frac{\delta}{\delta\varphi} \left(\frac{\phi(Z_i'\varphi)}{\Phi(Z_i'\varphi)} \right) = -[\lambda_1^2 + Z_i\varphi\lambda_i] Z_i$$

Thus,

$$\hat{\lambda}_i - \lambda_i = -(\hat{\varphi} - \varphi) \cdot [\lambda_1^2 + Z_i\varphi\lambda_i] Z_i$$

Now,

¹ This appendix is derived from Maddala (1983) 252-255, and Jenkins (1989), 70-73.

$$\hat{\lambda}_i - \lambda_i = DZ (\hat{\phi} - \phi)$$

$$\text{where } D = \text{diag } \lambda_1^2 + Z_1 \phi \lambda_i]$$

Therefore our selectivity wage equation

$$W = X'\beta - \sigma_{wu} \hat{\lambda} + \hat{\phi}$$

becomes

$$W = (X_i \quad - \hat{\lambda}) \begin{pmatrix} \beta_1 \\ \sigma_{wu} \end{pmatrix} + \hat{\phi}$$

Now, letting $G = [X_i, -\hat{\lambda}]$

then

$$\begin{pmatrix} \hat{\beta}_1 \\ \hat{\sigma}_{wu} \end{pmatrix} - \begin{pmatrix} \beta_1 \\ \sigma_{wu} \end{pmatrix} = (G'G)^{-1} G' \hat{\phi}$$

$$\text{and } \text{var} \begin{pmatrix} \hat{\beta}_1 \\ \hat{\sigma}_{wu} \end{pmatrix} = (G'G)^{-1} G' \text{var} (\hat{\phi}) (G'G)^{-1} G$$

$$\text{var} (\hat{\phi}) = \text{var} (\phi + \sigma_{wu} (\hat{\lambda} - \lambda))$$

$$= \text{var} (\phi + \sigma_{wu} DZ (\hat{\gamma} - \gamma))$$

$$= \text{var}(\phi) + \sigma_{wu}^2 DZ \text{var} (\hat{\gamma}) Z'D - \sigma_{wu}^2 DZ \text{cov} (\hat{\gamma}, \phi)$$

$$- \sigma_{wu}^2 (\text{cov} \hat{\gamma}, \phi) Z'D$$

This is calculated on $I_i = 1$. $\text{Var} (\hat{\gamma})$ is estimated from the participation equation's variance-covariance matrix.

It may be shown that $\text{cov} (\hat{\gamma}, \phi) = 0$ ².

Now to determine $\text{var} (\phi)$ ³

² Maddala, G.S.,(1983), 254

³ Maddala, G.S.,(1983), 225

$$\text{var}(\varphi_i | I_i = 1) = \sigma_w^2 - \sigma_{wu}^2 \lambda_i [Z' \gamma_i + \lambda_i]$$

Therefore,

$$\text{var}(\varphi_i) = \sigma_w^2 I - \sigma_{wu}^2 D$$

To estimate the variance obviously an estimate of σ_w^2 is needed. The residuals of the underlying equation must be corrected for selection bias to ensure a consistent estimate of the variance. The approach ⁴ is to estimate the residuals from the wage equation without sample selection correction. That is,

$$\varepsilon_w = W_i - X_i' \beta$$

Then, estimate the variance using the following

$$\hat{\sigma}_w^2 = \frac{1}{k} \cdot \sum_{i=1}^k [\varepsilon_w^2 + \hat{\sigma}_{wu}^2 Z_i' \hat{\gamma} \lambda_i]$$

Now we have

$$\text{var}(\hat{\varphi}) = \sigma_w^2 I - \sigma_{wu}^2 D + \sigma_{wu}^2 D Z \text{var}(\hat{\varphi}) Z' D$$

and

$$\text{var} \begin{pmatrix} \hat{\beta} \\ \hat{\sigma}_{wu} \end{pmatrix} = (G'G)^{-1} G' \text{var}(\hat{\varphi}) (G'G)^{-1} G$$

In the estimation of this matrix we use $\hat{\sigma}_{wu}$ as the parameter on the correction term $\hat{\lambda}$ in the wage equation, and $\hat{\sigma}_w^2$ is estimated as described above.

APPENDIX D : Sample means for regressors in dichotomous choice and wage equations, females, Australia and the United States (a)

Appendix D1 contain the sample means for the estimates used in the dichotomous employment status equations for Australia and the United States. Sample means for the trichotomous choice models were contained in Chapter 4 along with the regression estimates.

D1: Sample means, dichotomous employment status model, Australia and the United States, 1986/87

Variable	Australia	United States
ft	0.56	0.69
married	0.73	0.61
divorced	0.09	0.17
abor	0.00	0.14
ageyrs	36.25	36.71
ed2	0.40	0.44
ed3	0.24	0.21
ed4	0.07	0.26
kid1	0.21	0.22
kid2	0.22	0.18
kid3	0.09	0.06
kid4	0.02	0.01
kid5	0.01	0.01
murban	0.69	0.23
urban	0.19	0.34
yinc	21.61	1236.02

Table D2 : Sample means for wage equations, by employment status, Australia and the United States, 1986/87

Variable	Australia		United States	
	Part-time Mean of X	Full-time Mean of X	Part-time Mean of X	Full-time Mean of X
MURBAN/CITY	0.65	0.73	0.19	0.25
URBAN/MSA	0.23	0.16	0.35	0.34
ED2	0.37	0.43	0.45	0.44
ED3	0.26	0.23	0.22	0.21
ED4	0.06	0.08	0.26	0.28
EXP	22.43	18.70	17.42	18.90
EXP2	612.56	479.44	478.82	498.87
RACE	0.01	0.00	0.11	0.15
OCC2	0.12	0.10	0.15	0.17
OCC3	0.07	0.07	0.21	0.13
OCC4	0.04	0.04	0.24	0.31
OCC5	0.29	0.41	0.27	0.12
OCC6	0.21	0.13	0.03	0.02
OCC7	0.02	0.05	0.01	0.03
OCC8	0.21	0.14	0.04	0.10
GOVT	0.21	0.31	0.17	0.19
MARRIED	0.85	0.64	0.64	0.59
DIVORCE	0.07	0.11	0.11	0.20
LAMBDA (a)	0.34	1.09	-0.10	0.83

(a) note lambda refers the the trichotomous choice selection term. Variables for the choice equation were reported with the regression results.

APPENDIX E : Alternative specification of the experience term in the wage equations of full- and part-time workers, Australia (a)

Variable	Part-time		Full-time	
	Coeffic	t-ratio	Coeffic	t-ratio
Constant	2.2219	9.83 *	1.8792	19.585 *
MURBAN	9.29E-02	0.796	0.12632	2.907 *
URBAN	2.44E-02	0.182	5.55E-02	1.07
ED2	6.75E-02	0.727	-8.81E-03	-0.255
ED3	0.17881	1.486	9.36E-02	2.114 **
ED4	0.45122	2.41 *	0.24163	3.746 *
E	-1.24E-02	-0.846	1.75E-02	2.476 *
E2	3.15E-04	0.984	-3.66E-04	-2.093 **
RACE	-0.4378	-0.981	9.45E-02	0.416
OCC2	-6.09E-02	-0.44	0.12509	1.688 ***
OCC3	3.37E-02	0.233	0.12032	1.635 ***
OCC4	-0.2323	-1.486	-0.30185	-3.581 *
OCC5	-0.162	-1.309	4.03E-02	0.709
OCC6	-0.2735	-2.145 **	-0.21042	-3.309 *
OCC7	-3.44E-02	-0.193	-0.13845	-1.823 ***
OCC8	-0.3812	-3.014 *	-0.13877	-2.2 **
GOVT	1.43E-02	0.258	0.10986	3.645 *
MARRIED	-7.28E-03	-0.053	4.70E-02	1.229
DIVORCED	0.387	2.177 *	0.11491	2.105 **
LAMBDA	0.25146	1.645 *	-0.17746	-2.422 *
Dep. Var.		Inwhr		Inwhr
Observations		701		887
Mean of LHS		2.20E+00		2.02E+00
Adjusted R-squared		1.16E-01		2.20E-01
F(19, 681)		5.83E+00 F(19,867)		1.42E+01
Mean experience		17.95		14.96
Mean experience 2		392.04		306.84

(a) when Mincer's experience term for individuals is reduced by 20 percent

APPENDIX F : Alternative specification of the experience term in the female wage equations of full- and part-time workers, United States^(a)

Variable	Part-time		Full-time	
	Coefficien †	t-ratio	Coefficien †	t-ratio
Constant	1.3175	6.006 *	1.5531	14.11 *
CITY	3.29E-02	0.376	0.1586	5.166 *
MSA	7.66E-02	1.073	0.20572	7.629 *
ED2	5.68E-02	0.391	0.15234	2.666 *
ED3	0.12128	0.741	0.25733	3.927 *
ED4	0.36675	2.023 **	0.47252	6.561 *
E	5.10E-03	0.371	4.23E-02	8.384 *
E2	-1.84E-04	-0.534	-9.18E-04	-6.944 *
RACE	-2.25E-02	-0.217	-2.50E-02	-0.729
OCC2	0.19381	1.135	-5.42E-02	-1.174
OCC3	-6.67E-02	-0.403	-0.19673	-4.249 *
OCC4	-0.10073	-0.62	-0.15063	-3.824 *
OCC5	-0.14196	-0.867	-0.53664	-10.855 *
OCC6	-0.48634	-2.074 **	-0.62653	-7.188 *
OCC7	0.29185	0.642	4.89E-02	0.628
OCC8	-0.13562	-0.632	-0.21249	-4.063 *
GOVT	0.14367	1.643 ***	4.62E-02	1.438
MARRIED	0.17167	1.581 ***	-1.32E-02	-0.404
DIVORCE	0.35213	2.41 *	-5.80E-02	-1.329
LAMBDA	2.57E-02	0.215	-0.18355	-2.572 *
Dep. Variable		lnwhr		lnwhr
Observations		1109		3006
Mean of LHS		1.61E+00		1.92E+00
StdDev of residuals		1.04E+00		6.33E-01
Adjusted R-squared		4.56E-02		1.96E-01
F(19, n-20)		3.79E+00		3.95E+01
Mean experience		13.935		1.51E+01
Mean experience 2		306.44		3.19E+02

(a) when Mincer's experience term for individuals is reduced by 20 percent

APPENDIX G : Appendix to Chapter 6

G6.1 Extension of the model to include industry effects⁵

Until now this study has undertaken an analysis of female wages with respect to human capital, demographic and occupational endowments. The theory for these variables is relatively clear. Most United States studies have found that industries do appear to exhibit an effect on wages (both full- and part-time), and that the full-time industry effect on wages has been relatively constant over time⁶.

Although there is several levels at which industries may be included into a regression equation, Kreuger and Summers (1988) found that the dispersion of earnings increased with the level of industry differentiation. For the one digit level, Kreuger and Summers found that after controlling for human capital, occupational and demographic characteristics ⁷, for 1974 and 1984, construction, manufacturing, transport and public utilities and mining paid above average wages whilst wholesale and retail trades, and other services paid below average wages. In 1984, tobacco, petroleum and public utilities were amongst the highest paying industries at the two digit level and private household and welfare services were at the lowest levels of pay.

Kreuger and Summers (1988) in their analysis of fringe benefits found that the non-wage compensation reinforced rather than reduced industry wage differential. In other words, industries which pay more are also likely to pay fringe benefits. Hence, the effect of fringe benefits on inter-industry wage differentials was to increase them.

⁵ Industry effects on age earning's profiles in Australia and the United States are analysed in Daly (1990).

⁶ See Daly (1990) for further discussion of industry effects on full-time workers p 134

⁷ The control variables were education, occupation, regional location, marital status, veteran status, race and union membership.

Although no Australian study has investigated the industry differentials for full- and part-time workers, there has been some cross-sectional analyses conducted for full-time workers. Hughes (1984) used 1963 earnings data for the average male production workers in 63 manufacturing industries. Although human capital characteristics were not controlled for due to data limitation, the restriction of the sample to production workers itself provides some form of control. The findings of the survey reveal that production workers in mineral oils, paper making, chemical and iron and steel foundries were paid above average rates whilst production workers in boxes and cases, brooms and brushes, and dye work and cleaning were relatively poorly paid.

Chapman and Miller's (1983) study utilising the 1976 Census ⁸ found that males in the mining and construction industries had relatively high initial hourly income but the returns to experience were not greater in these industries when compared to other industries. Wholesale and retail trade had relatively low initial levels of hourly income, but the earnings profile for these industries over time were steeper than other industries. Chapman and Mulvey (1982) using data for 1982 found mining, chemicals, electricity and construction earned above average wages (after controlling for human capital, demographic and occupations⁹) whilst the reverse was true for community services, entertainment, retailing and agriculture.

Borland and Suen (1989) using 1986 data found that after controlling for education, experience, state of residence, occupation, country of birth, marital status and a dummy for participation in a superannuation scheme¹⁰, found similar results to the Chapman and Mulvey study, where wages were above

⁸ Data on this survey were reported on a grouped basis.

⁹ The control variables were education, experience, marital status, place of birth, place of residence and occupational classification.

¹⁰ Which was at that time not compulsory.

average in mining, electricity, gas and water, communications and transport and lower in wholesale and retail trades and community services.

A6.2 Why are industries important to wages ?

There are many justifications commonly employed for the incorporation of industry effects as explanators of wages. In placing industry dummies into an earnings equation, researchers interpret the coefficients on these dummy variables as an indication of the extent of on-the-job training specific to that industry, the costs of shirking or labour turnover, immeasurable differences in labour quality¹¹, the degree of unionisation of an industry, the effect of plant or company size¹², the occupational mix of an industry¹³, or the presence of compensating differentials¹⁴ between industries.

In this analysis, the inclusion of industries into the wage equation for full- and part-time workers may, in addition to the factors listed above, reflect the degree of disequilibrium of the labour market. That is, part-time wages may be relatively higher for a particular industry as a result of excess demand for part-time work. This may result from influences detailed in Chapter 3 such as the nature of the job and the degree of unionisation.. An example of excess

¹¹ Such as type of educational status (including the type of degree, private or public schools and so on) and motivation and innate ability. If labour quality differences were systematically related to some unmeasured factors such as technological sophistication, then, given both Australia and the United States are developed countries, we would expect a close correlation in the ranking of industries between countries.

¹² Brown and Medoff (1989) suggested that employer size should affect the earnings differentials between industries. Dickens and Katz (1987) found a positive relationship between establishment size and industry wage levels.

¹³ As the previous chapter demonstrated, occupations are important in the explanation of wages. If the mix of occupations in a given industry affected the wages of the industry, then this would lead to a significant coefficient on the industry dummy. However, if occupational classification were also accounted for in the analysis, the effect of industry status on earnings would be reduced.

¹⁴ The argument follows that the industry effect on earnings arises from differences in costs of hiring and/or differing terms and conditions of work.

supply limiting wages may be the retail industry where the availability of cheaper youth part-time wages lowers the part-time returns to this industry.

TABLE A6.1 : Full- and part-time wage equations, Australian Females

Variable	Full-time		Part-time	
	Coeffic	t-statistic	Coeffic	t-statistic
murban	0.107	(2.515)	0.041	(0.633)
urban	0.028	(0.559)	0.060	(0.834)
ed2	0.020	(0.637)	0.037	(0.765)
ed3	0.149	(3.962)	0.123	(2.052)
ed4	0.277	(4.443)	0.388	(3.610)
exp	0.029	(6.279)	0.015	(1.739)
exp2	-0.001	-(5.569)	0.000	-(1.073)
race	-0.081	-(0.459)	-0.143	-(0.518)
occ2	0.101	(1.294)	-0.154	-(1.096)
occ3	0.120	(1.533)	-0.039	-(0.261)
occ4	-0.269	-(3.194)	-0.322	-(1.989)
occ5	-0.010	-(0.170)	-0.217	-(1.733)
occ6	-0.226	-(3.487)	-0.342	-(2.650)
occ7	-0.197	-(2.390)	-0.095	-(0.520)
occ8	-0.157	-(2.400)	-0.434	-(3.410)
govt	0.147	(3.732)	0.082	(1.253)
married	0.091	(2.446)	0.127	(1.570)
divorced	0.080	(1.507)	0.491	(4.554)
ind2	-0.024	-(0.102)	-0.016	-(0.039)
ind3	0.252	(3.460)	0.146	(1.158)
ind45	0.054	(0.559)	0.028	(0.174)
ind6	0.199	(2.857)	0.015	(0.140)
ind7	0.348	(3.330)	0.089	(0.485)
ind8	0.112	(0.888)	-0.395	-(1.758)
ind9	0.279	(3.857)	0.153	(1.344)
ind10	0.182	(2.078)	-0.162	-(0.980)
ind11	0.181	(2.475)	0.048	(0.435)
ind12	0.102	(1.196)	0.087	(0.740)
lambda	-0.228	-(3.836)	-0.078	-(0.874)
_cons	1.477	(16.345)	1.842	(9.170)
Number of obs = 977		Number of obs = 760		
F(29, 947) = 14.68		F(29, 730) = 5.83		
Adj R-square = 0.29		Adj R-square = 0.1558		
Mean Dep. = 1.97		Mean Dep. = 2.15		

TABLE A6.2: Full- and part-time wage equations, United States Estimates

Variable	Full-time		Part-time	
	Coeffic	t-statistic	Coeffic	t-statistic
city	0.108	(3.326)	0.025	(0.305)
msa	0.179	(6.485)	0.095	(1.452)
ed2	0.243	(5.014)	0.041	(0.357)
ed3	0.361	(6.600)	0.095	(0.736)
ed4	0.582	(10.066)	0.359	(2.620)
exp	0.034	(8.533)	0.004	(0.410)
exp2	-0.001	-(7.122)	0.000	-(0.406)
race	-0.054	-(1.542)	0.038	(0.410)
occ2	-0.044	-(0.885)	0.158	(0.965)
occ3	-0.149	-(3.117)	-0.031	-(0.201)
occ4	-0.288	-(3.540)	0.206	(0.470)
occ5	-0.178	-(4.435)	-0.102	-(0.674)
occ6	-0.452	-(8.658)	-0.105	-(0.677)
occ7	-0.400	-(6.815)	-0.221	-(1.087)
occ8	-0.607	-(6.759)	-0.379	-(1.719)
govt	0.054	(1.345)	0.076	(0.828)
married	-0.028	-(0.823)	0.190	(1.959)
divorce	-0.112	-(2.289)	0.348	(2.366)
ind2	0.503	(2.525)	1.736	(2.315)
ind3	0.247	(3.036)	0.374	(1.467)
ind45	0.141	(1.237)	0.122	(0.260)
ind6	-0.006	-(0.071)	0.240	(0.994)
ind7	-0.066	-(0.582)	0.167	(0.490)
ind8	0.279	(5.211)	0.370	(1.422)
ind9	0.134	(1.533)	0.082	(0.328)
ind10	0.185	(1.813)	0.452	(1.487)
ind11	0.097	(1.127)	0.312	(1.278)
ind12	-0.111	-(1.104)	0.096	(0.373)
lambda	-0.384	-(3.167)	0.105	(0.492)
_cons	1.415	(10.830)	1.140	(3.155)

Number of obs = 3170
 F(29, 3140) = 31.09
 Adj R-square = 0.2159
 Mean of Dep. = 1.891422

Number of obs = 1237
 F(29, 1207) = 3.62
 Adj R-square = 0.0580
 Mean of Dep. = 1.593463

APPENDIX G6.3 : Auxilliary Wage Equations, Australia

Full-time, Occupation 1

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
murban	0.4299	0.2490	1.7270	0.0920	-0.0726	0.9323
urban	-0.1496	0.2594	-0.5770	0.5670	-0.6730	0.3738
ed2	0.1001	0.2240	0.4470	0.6570	-0.3520	0.5521
ed3	0.2089	0.2976	0.7020	0.4870	-0.3918	0.8095
ed4	0.5817	0.4939	1.1780	0.2460	-0.4151	1.5784
exp	0.0418	0.0460	0.9080	0.3690	-0.0511	0.1346
exp2	-0.0008	0.0008	-0.9380	0.3540	-0.0024	0.0009
govt	-0.0641	0.2837	-0.2260	0.8220	-0.6366	0.5085
married	0.2472	0.3696	0.6690	0.5070	-0.4987	0.9932
lambda	-0.2822	0.6340	-0.4450	0.6580	-1.5616	0.9972
_cons	1.3715	0.6122	2.2400	0.0300	0.1360	2.6069

Number of obs = 53

F(10, 42) = 1.89

Prob > F = 0.0745

R-square = 0.3100

Adj R-square = 0.1457

Root MSE = .59846

Part-time, Occupation 1

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
murban	0.6204	0.2955	2.0990	0.0580	-0.0234	1.2643
urban	0.4406	0.3365	1.3090	0.2150	-0.2926	1.1738
ed2	-0.4996	0.3437	-1.4540	0.1720	-1.2485	0.2492
ed3	-0.2966	0.4222	-0.7030	0.4960	-1.2164	0.6232
ed4	0.6780	0.6110	1.1100	0.2890	-0.6532	2.0092
exp	-0.0912	0.0688	-1.3240	0.2100	-0.2412	0.0588
exp2	0.0017	0.0012	1.4610	0.1700	-0.0008	0.0043
govt	-0.6971	0.5197	-1.3410	0.2050	-1.8295	0.4353
married	0.4743	0.5372	0.8830	0.3950	-0.6961	1.6447
lambda	0.0712	0.6041	0.1180	0.9080	-1.2450	1.3874
_cons	2.8662	1.1317	2.5330	0.0260	0.4005	5.3320

Number of obs = 23

F(10, 12) = 1.85

Prob > F = 0.1560

R-square = 0.6063

Adj R-square = 0.2782

Full-time, Occupation 2

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
murban	0.1949	0.1329	1.4670	0.1460	-0.0695	0.4593
urban	0.2093	0.1594	1.3130	0.1930	-0.1079	0.5265
ed2	0.2071	0.1778	1.1650	0.2480	-0.1467	0.5608
ed3	0.2508	0.1938	1.2940	0.1990	-0.1348	0.6364
ed4	0.2077	0.1394	1.4900	0.1400	-0.0697	0.4850
exp	0.0417	0.0301	1.3860	0.1700	-0.0182	0.1017
exp2	-0.0008	0.0007	-1.1440	0.2560	-0.0021	0.0006
govt	0.1492	0.0965	1.5450	0.1260	-0.0430	0.3413
married	0.2483	0.1258	1.9750	0.0520	-0.0020	0.4986
lambda	-0.1830	0.2703	-0.6770	0.5000	-0.7209	0.3550
_cons	1.3395	0.3236	4.1400	0.0000	0.6956	1.9834

Number of obs = 91

F(10, 80) = 2.74

Prob > F = 0.0059

R-square = 0.2552

Adj R-square = 0.1621

Root MSE = .39329

Part-time, Occupation 2

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
murban	0.1116	0.2238	0.4990	0.6190	-0.3340	0.5573
urban	-0.1995	0.2701	-0.7390	0.4620	-0.7374	0.3384
ed2	0.1261	0.2262	0.5580	0.5790	-0.3244	0.5766
ed3	0.2466	0.2761	0.8930	0.3750	-0.3033	0.7964
ed4	0.4364	0.2393	1.8240	0.0720	-0.0401	0.9130
exp	0.0018	0.0432	0.0410	0.9670	-0.0843	0.0878
exp2	0.0000	0.0009	-0.0580	0.9540	-0.0018	0.0017
govt	0.1443	0.1439	1.0030	0.3190	-0.1423	0.4308
married	0.1238	0.2492	0.4970	0.6210	-0.3726	0.6202
lambda	-0.0180	0.3620	-0.0500	0.9600	-0.7389	0.7029
_cons	1.8988	0.4527	4.1950	0.0000	0.9973	2.8004

Number of obs = 87

F(10, 76) = 1.64

Prob > F = 0.1121

R-square = 0.1772

Adj R-square = 0.0690

Root MSE = .63691

Full-time, Occupation 3

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
murban	-0.1151	0.1110	-1.0370	0.3040	-0.3376	0.1074
urban	-0.0491	0.1211	-0.4060	0.6870	-0.2919	0.1937
ed2	0.2038	0.1494	1.3640	0.1780	-0.0957	0.5034
ed3	0.2143	0.1390	1.5420	0.1290	-0.0644	0.4929
exp	0.0352	0.0141	2.4930	0.0160	0.0069	0.0636
exp2	-0.0006	0.0003	-1.9270	0.0590	-0.0013	0.0000
govt	-0.0749	0.0704	-1.0640	0.2920	-0.2161	0.0662
married	0.1046	0.0845	1.2380	0.2210	-0.0648	0.2741
lambda	-0.3853	0.1914	-2.0140	0.0490	-0.7690	-0.0017
_cons	2.1374	0.2899	7.3730	0.0000	1.5562	2.7187

Number of obs = 64

F(9, 54) = 1.75

Prob > F = 0.1003

R-square = 0.2257

Adj R-square = 0.0966

Root MSE = .26069

Part-time, Occupation 3

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
murban	0.6959	0.2764	2.5180	0.0160	0.1381	1.2538
urban	0.3936	0.2901	1.3570	0.1820	-0.1918	0.9791
ed2	0.7049	0.4190	1.6820	0.1000	-0.1407	1.5505
ed3	0.7850	0.3522	2.2290	0.0310	0.0742	1.4958
exp	-0.0398	0.0346	-1.1500	0.2560	-0.1097	0.0300
exp2	0.0005	0.0007	0.7450	0.4600	-0.0008	0.0018
govt	0.1139	0.1443	0.7890	0.4340	-0.1774	0.4052
married	-0.5203	0.3209	-1.6210	0.1120	-1.1679	0.1274
lambda	0.3462	0.3885	0.8910	0.3780	-0.4378	1.1302
_cons	2.0668	0.6595	3.1340	0.0030	0.7359	3.3977

Number of obs = 52

F(9, 42) = 2.50

Prob > F = 0.0220

R-square = 0.3484

Adj R-square = 0.2088

Root MSE = .46503

Full-time, Occupation 4

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
murban	0.8299	0.3830	2.1670	0.0410	0.0376	1.6222
urban	0.7142	0.5023	1.4220	0.1690	-0.3250	1.7533
ed2	0.6672	0.4323	1.5430	0.1360	-0.2270	1.5615
ed3	0.5454	0.4645	1.1740	0.2520	-0.4155	1.5062
exp	0.0360	0.0399	0.9010	0.3770	-0.0466	0.1186
exp2	0.0000	0.0007	0.0190	0.9850	-0.0015	0.0015
govt	0.2763	0.6257	0.4420	0.6630	-1.0181	1.5706
married	0.1765	0.3045	0.5800	0.5680	-0.4533	0.8063
lambda	-0.2227	0.6954	-0.3200	0.7520	-1.6611	1.2158
_cons	-0.0872	0.9833	-0.0890	0.9300	-2.1213	1.9470

Number of obs = 33

F(9, 23) = 1.35

Prob > F = 0.2658

R-square = 0.3460

Adj R-square = 0.0900

Root MSE = .5823

Part-time, Occupation 4

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
murban	-0.0881	0.2697	-0.3260	0.7480	-0.6571	0.4810
urban	-0.4715	0.3977	-1.1850	0.2520	-1.3106	0.3676
ed2	0.3516	0.2710	1.2970	0.2120	-0.2202	0.9234
ed3	0.8430	0.3830	2.2010	0.0420	0.0349	1.6510
exp	-0.0491	0.0674	-0.7290	0.4760	-0.1913	0.0931
exp2	0.0011	0.0012	0.8850	0.3890	-0.0015	0.0037
govt	-0.2618	0.4527	-0.5780	0.5710	-1.2168	0.6933
married	0.0809	0.3480	0.2330	0.8190	-0.6534	0.8152
lambda	1.0962	0.6720	1.6310	0.1210	-0.3216	2.5139
_cons	1.9516	0.7356	2.6530	0.0170	0.3996	3.5036

Number of obs = 27

F(9, 17) = 0.79

Prob > F = 0.6265

R-square = 0.2959

Adj R-square = -0.0768

Root MSE = .49806

Full-time, Occupation 5

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
murban	0.0036	0.0637	0.0570	0.9550	-0.1217	0.1289
urban	0.0035	0.0778	0.0450	0.9640	-0.1494	0.1564
ed2	-0.0273	0.0442	-0.6180	0.5370	-0.1142	0.0596
ed3	0.0470	0.0569	0.8260	0.4090	-0.0649	0.1589
ed4	0.2615	0.1184	2.2090	0.0280	0.0287	0.4943
exp	0.0126	0.0078	1.6070	0.1090	-0.0028	0.0279
exp2	-0.0002	0.0002	-1.2090	0.2280	-0.0005	0.0001
govt	0.1220	0.0376	3.2470	0.0010	0.0481	0.1959
married	0.0195	0.0489	0.3980	0.6910	-0.0767	0.1156
lambda	-0.1821	0.0921	-1.9780	0.0490	-0.3632	-0.0011
_cons	2.0819	0.1090	19.0950	0.0000	1.8675	2.2964

Number of obs = 367

F(10, 356) = 2.73

Prob > F = 0.0031

R-square = 0.0711

Adj R-square = 0.0450

Root MSE = .32497

Part-time, Occupation 5

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
murban	0.1564	0.1323	1.1820	0.2390	-0.1046	0.4175
urban	0.1862	0.1503	1.2400	0.2170	-0.1101	0.4826
ed2	0.0512	0.0988	0.5190	0.6050	-0.1437	0.2462
ed3	0.0972	0.1301	0.7470	0.4560	-0.1593	0.3537
ed4	-0.2560	0.2941	-0.8700	0.3850	-0.8362	0.3243
exp	0.0090	0.0210	0.4300	0.6680	-0.0324	0.0505
exp2	0.0000	0.0004	0.1190	0.9060	-0.0007	0.0008
govt	-0.0127	0.1126	-0.1130	0.9100	-0.2349	0.2094
married	-0.0779	0.2155	-0.3610	0.7180	-0.5030	0.3472
lambda	-0.0311	0.1703	-0.1830	0.8550	-0.3672	0.3049
_cons	1.8886	0.2799	6.7470	0.0000	1.3364	2.4408

Number of obs = 200

F(10, 189) = 0.93

Prob > F = 0.5099

R-square = 0.0467

Adj R-square = -0.0037

Root MSE = .55078

Full-time, Occupation 6

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
murban	0.1949	0.1428	1.3650	0.1750	-0.0884	0.4782
urban	-0.0654	0.1633	-0.4010	0.6890	-0.3893	0.2585
ed2	-0.0541	0.1099	-0.4920	0.6240	-0.2721	0.1639
ed3	0.0397	0.1451	0.2740	0.7850	-0.2481	0.3275
ed4	0.0899	0.3327	0.2700	0.7880	-0.5702	0.7500
exp	0.0150	0.0196	0.7680	0.4440	-0.0238	0.0539
exp2	-0.0004	0.0004	-0.9270	0.3560	-0.0012	0.0004
govt	0.1624	0.1156	1.4050	0.1630	-0.0669	0.3917
married	-0.0052	0.1129	-0.0460	0.9640	-0.2292	0.2189
lambda	-0.2460	0.2317	-1.0620	0.2910	-0.7057	0.2136
_cons	1.8255	0.2402	7.6010	0.0000	1.3491	2.3019

Number of obs = 112

F(10, 101) = 1.78

Prob > F = 0.0745

R-square = 0.1495

Adj R-square = 0.0653

Root MSE = .43347

Part-time, Occupation 6

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
murban	-0.0945	0.1943	-0.4860	0.6280	-0.4787	0.2898
urban	-0.1839	0.2021	-0.9100	0.3650	-0.5835	0.2158
ed2	0.0309	0.1177	0.2620	0.7930	-0.2019	0.2637
ed3	0.1753	0.1411	1.2420	0.2160	-0.1038	0.4545
ed4	0.0347	0.3709	0.0940	0.9260	-0.6988	0.7682
exp	-0.0143	0.0195	-0.7330	0.4650	-0.0529	0.0243
exp2	0.0002	0.0004	0.6490	0.5170	-0.0005	0.0009
govt	-0.0389	0.1950	-0.1990	0.8420	-0.4246	0.3469
married	0.0803	0.1794	0.4480	0.6550	-0.2744	0.4350
lambda	0.4039	0.1979	2.0410	0.0430	0.0125	0.7954
_cons	2.1441	0.2641	8.1180	0.0000	1.6218	2.6664

Number of obs = 146

F(10, 135) = 1.09

Prob > F = 0.3726

R-square = 0.0748

Adj R-square = 0.0063

Root MSE = .55951

Full-time, Occupation 7

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
murban	0.1160	0.1460	0.7950	0.4320	-0.1795	0.4115
urban	-0.0394	0.1986	-0.1980	0.8440	-0.4413	0.3626
ed2	-0.1533	0.1036	-1.4800	0.1470	-0.3629	0.0564
ed3	-0.1904	0.1273	-1.4950	0.1430	-0.4482	0.0675
exp	0.0199	0.0182	1.0940	0.2810	-0.0169	0.0568
exp2	-0.0002	0.0004	-0.6970	0.4900	-0.0010	0.0005
govt	-0.2148	0.2854	-0.7530	0.4560	-0.7926	0.3629
lambda	-0.2206	0.2102	-1.0490	0.3010	-0.6462	0.2050
_cons	1.8338	0.2317	7.9130	0.0000	1.3647	2.3030

Number of obs = 47

F(8, 38) = 1.46

Prob > F = 0.2059

R-square = 0.2346

Adj R-square = 0.0734

Root MSE = .26685

Part-time, Occupation 7

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
murban	0.6627	0.9154	0.7240	0.4900	-1.4481	2.7735
urban	0.5167	0.8089	0.6390	0.5410	-1.3487	2.3821
ed2	2.6558	1.6080	1.6520	0.1370	-1.0521	6.3638
ed3	0.7505	0.9271	0.8100	0.4420	-1.3874	2.8884
exp	-0.0353	0.1312	-0.2690	0.7950	-0.3377	0.2672
exp2	0.0009	0.0029	0.3290	0.7500	-0.0057	0.0076
govt	-1.4715	1.0702	-1.3750	0.2060	-3.9394	0.9964
lambda	0.7858	1.2165	0.6460	0.5360	-2.0196	3.5911
_cons	1.4822	1.4472	1.0240	0.3360	-1.8551	4.8194

Number of obs = 17

F(8, 8) = 0.46

Prob > F = 0.8506

R-square = 0.3172

Adj R-square = -0.3656

Root MSE = .80954

Full-time, Occupation 8

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
murban	0.2030	0.1274	1.5920	0.1140	-0.0496	0.4555
urban	0.2293	0.1476	1.5530	0.1230	-0.0633	0.5218
ed2	-0.0665	0.0795	-0.8360	0.4050	-0.2240	0.0911
ed3	0.0788	0.1540	0.5120	0.6100	-0.2264	0.3840
exp	0.0129	0.0151	0.8510	0.3960	-0.0171	0.0429
exp2	-0.0002	0.0003	-0.8620	0.3910	-0.0008	0.0003
govt	0.0502	0.0828	0.6060	0.5460	-0.1139	0.2142
married	0.0421	0.1296	0.3250	0.7460	-0.2148	0.2990
lambda	-0.2512	0.1683	-1.4930	0.1380	-0.5847	0.0823
_cons	1.8323	0.2099	8.7290	0.0000	1.4163	2.2483

Number of obs = 120
 F(9, 110) = 0.95
 Prob > F = 0.4878
 R-square = 0.0719
 Adj R-square = -0.0040
 Root MSE = .36233

Part-time, Occupation 8

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
murban	-0.0004	0.1251	-0.0030	0.9980	-0.2477	0.2469
urban	0.0484	0.1482	0.3270	0.7440	-0.2445	0.3414
ed2	0.1793	0.1082	1.6570	0.1000	-0.0346	0.3933
ed3	0.4116	0.1812	2.2710	0.0250	0.0533	0.7700
exp	0.0299	0.0223	1.3400	0.1830	-0.0142	0.0739
exp2	-0.0005	0.0004	-1.2350	0.2190	-0.0012	0.0003
govt	-0.1293	0.1124	-1.1500	0.2520	-0.3516	0.0929
married	-0.3635	0.2185	-1.6640	0.0980	-0.7955	0.0685
lambda	0.5420	0.1897	2.8580	0.0050	0.1670	0.9171
_cons	1.5869	0.2788	5.6910	0.0000	1.0356	2.1383

Number of obs = 149
 F(9, 139) = 2.12
 Prob > F = 0.0312
 R-square = 0.1209
 Adj R-square = 0.0640
 Root MSE = .54962

APPENDIX G6.4 : Auxilliary Wage Equations, United States

Full-time, Occupation 1

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
city	-0.06449	0.097	-0.663	0.508	-0.256	0.127
msa	0.24568	0.089	2.772	0.006	0.071	0.420
ed2	0.17658	0.262	0.675	0.500	-0.338	0.691
ed3	0.47751	0.270	1.772	0.077	-0.052	1.008
ed4	0.62506	0.279	2.237	0.026	0.076	1.175
exp	0.05304	0.014	3.739	0.000	0.025	0.081
exp2	-0.00096	0.000	-3.191	0.002	-0.002	0.000
govt	0.06762	0.102	0.665	0.506	-0.132	0.268
married	-0.10514	0.100	-1.054	0.292	-0.301	0.091
lambda	-0.39273	0.213	-1.844	0.066	-0.811	0.026
_cons	1.51890	0.374	4.058	0.000	0.783	2.255

Number of obs = 377

F(10, 366) = 6.12

Prob > F = 0.0000

R-square = 0.1432

Adj R-square = 0.1198

Root MSE = .71908

Part-time, Occupation 1

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
city	0.27338	0.676	0.404	0.688	-1.095	1.641
msa	0.39323	0.615	0.640	0.526	-0.850	1.637
ed2	0.61197	1.276	0.480	0.634	-1.969	3.192
ed3	0.71280	1.208	0.590	0.558	-1.730	3.156
ed4	-0.09711	1.340	-0.072	0.943	-2.808	2.614
exp	-0.00726	0.086	-0.084	0.933	-0.182	0.167
exp2	0.00005	0.002	0.026	0.979	-0.003	0.004
govt	0.74178	0.691	1.074	0.290	-0.656	2.139
married	-0.12132	0.761	-0.159	0.874	-1.660	1.418
lambda	0.08058	0.364	0.221	0.826	-0.656	0.818
_cons	1.33096	1.384	0.962	0.342	-1.468	4.129

Number of obs = 50

F(10, 39) = 0.37

Prob > F = 0.9536

R-square = 0.0860

Adj R-square = -0.1483

Root MSE = 1.6816

Full-time, Occupation 2

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
city	0.25488	0.080	3.178	0.002	0.097	0.412
msa	0.25335	0.073	3.473	0.000	0.110	0.397
ed2	0.06878	0.142	0.483	0.629	-0.211	0.349
ed4	0.54488	0.105	5.193	0.000	0.339	0.751
exp	0.02018	0.011	1.831	0.068	-0.001	0.042
exp2	-0.00031	0.000	-1.159	0.247	-0.001	0.000
govt	0.03735	0.066	0.568	0.571	-0.092	0.167
married	0.04469	0.086	0.523	0.602	-0.123	0.213
lambda	-0.03688	0.182	-0.203	0.839	-0.394	0.320
_cons	1.39492	0.184	7.587	0.000	1.034	1.756

Number of obs = 498

F(9, 488) = 7.67

Prob > F = 0.0000

R-square = 0.1239

Adj R-square = 0.1077

Root MSE = .6865

Part-time, Occupation 2

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
city	-0.00082	0.172	-0.005	0.996	-0.340	0.339
msa	0.12031	0.141	0.856	0.393	-0.157	0.398
ed2	-0.05015	0.236	-0.212	0.832	-0.517	0.417
ed4	0.68399	0.170	4.016	0.000	0.348	1.020
exp	-0.03249	0.025	-1.287	0.200	-0.082	0.017
exp2	0.00064	0.001	1.094	0.276	-0.001	0.002
govt	-0.03911	0.131	-0.298	0.766	-0.298	0.220
married	0.11657	0.243	0.479	0.633	-0.364	0.597
lambda	0.59286	0.252	2.355	0.020	0.096	1.090
_cons	1.87393	0.240	7.794	0.000	1.399	2.349

Number of obs = 165

F(9, 155) = 2.98

Prob > F = 0.0027

R-square = 0.1475

Adj R-square = 0.0980

Root MSE = .77791

Full-time, Occupation 3

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
city	0.18989	0.103	1.845	0.066	-0.012	0.392
msa	0.19826	0.091	2.186	0.029	0.020	0.377
ed2	-0.22020	0.096	-2.299	0.022	-0.409	-0.032
ed3	-0.10418	0.106	-0.986	0.325	-0.312	0.104
exp	0.04959	0.015	3.410	0.000	0.021	0.078
exp2	-0.00107	0.000	-3.397	0.000	-0.002	0.000
govt	0.14630	0.160	0.912	0.362	-0.169	0.462
married	0.00543	0.115	0.047	0.962	-0.220	0.231
lambda	-0.48931	0.198	-2.471	0.014	-0.879	-0.100
_cons	1.88059	0.187	10.070	0.000	1.513	2.248

Number of obs = 384

F(9, 374) = 4.18

Prob > F = 0.0000

R-square = 0.0915

Adj R-square = 0.0696

Root MSE = .76452

Part-time, Occupation 3

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
city	-0.03666	0.167	-0.219	0.826	-0.366	0.292
msa	0.11379	0.139	0.818	0.414	-0.160	0.388
ed2	-0.40715	0.152	-2.670	0.008	-0.708	-0.107
ed3	-0.17001	0.179	-0.950	0.343	-0.523	0.183
exp	0.01516	0.020	0.745	0.457	-0.025	0.055
exp2	-0.00015	0.000	-0.373	0.709	-0.001	0.001
govt	0.12265	0.275	0.446	0.656	-0.419	0.665
married	0.19592	0.202	0.972	0.332	-0.201	0.593
lambda	-0.00140	0.210	-0.007	0.995	-0.415	0.412
_cons	1.46524	0.209	7.002	0.000	1.053	1.878

Number of obs = 234

F(9, 224) = 2.03

Prob > F = 0.0373

R-square = 0.0754

Adj R-square = 0.0382

Root MSE = .92216

Full-time, Occupation 4

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
city	0.14064	0.034	4.124	0.000	0.074	0.208
msa	0.15137	0.030	5.041	0.000	0.092	0.210
ed2	-0.00486	0.102	-0.048	0.962	-0.205	0.195
ed3	0.08081	0.106	0.761	0.447	-0.128	0.289
ed4	0.16410	0.112	1.462	0.144	-0.056	0.384
exp	0.03613	0.005	7.730	0.000	0.027	0.045
exp2	-0.00058	0.000	-5.869	0.000	-0.001	0.000
govt	-0.05627	0.033	-1.706	0.088	-0.121	0.008
married	-0.01940	0.038	-0.516	0.606	-0.093	0.054
lambda	-0.18535	0.072	-2.591	0.010	-0.326	-0.045
_cons	1.58034	0.138	11.460	0.000	1.310	1.851

Number of obs = 941

F(10, 930) = 15.09

Prob > F = 0.0000

R-square = 0.1396

Adj R-square = 0.1304

Root MSE = .39931

Part-time, Occupation 4

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
city	0.27373	0.240	1.139	0.256	-0.199	0.747
msa	0.06921	0.181	0.381	0.703	-0.288	0.427
ed2	-0.11064	0.583	-0.190	0.850	-1.258	1.036
ed3	-0.54151	0.613	-0.883	0.378	-1.749	0.666
ed4	-0.21360	0.634	-0.337	0.737	-1.463	1.035
exp	-0.01239	0.033	-0.378	0.706	-0.077	0.052
exp2	0.00007	0.001	0.108	0.914	-0.001	0.001
govt	0.43805	0.214	2.047	0.042	0.017	0.859
married	0.47411	0.347	1.365	0.174	-0.210	1.158
lambda	-0.88596	0.339	-2.617	0.009	-1.553	-0.219
_cons	1.40313	0.600	2.339	0.020	0.222	2.585

Number of obs = 270

F(10, 259) = 1.83

Prob > F = 0.0558

R-square = 0.0660

Adj R-square = 0.0299

Root MSE = 1.332

Full-time, Occupation 5

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
city	0.28290	0.083	3.420	0.000	0.120	0.446
msa	0.21341	0.082	2.590	0.010	0.051	0.375
ed2	-0.03107	0.116	-0.267	0.790	-0.260	0.198
ed3	0.13451	0.148	0.910	0.363	-0.156	0.425
ed4	0.26257	0.177	1.483	0.139	-0.086	0.611
exp	0.02582	0.011	2.393	0.017	0.005	0.047
exp2	-0.00045	0.000	-2.082	0.038	-0.001	0.000
govt	0.23501	0.101	2.333	0.020	0.037	0.433
married	-0.07871	0.090	-0.874	0.383	-0.256	0.098
lambda	-0.23073	0.157	-1.466	0.143	-0.540	0.079
_cons	1.24517	0.239	5.205	0.000	0.775	1.716

Number of obs = 360

F(10, 349) = 3.70

Prob > F = 0.0001

R-square = 0.0958

Adj R-square = 0.0699

Root MSE = .63937

Part-time, Occupation 5

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
city	0.12060	0.095	1.267	0.206	-0.067	0.308
msa	0.02621	0.086	0.305	0.761	-0.143	0.196
ed2	0.02601	0.141	0.184	0.854	-0.252	0.304
ed3	0.29501	0.176	1.678	0.094	-0.051	0.641
ed4	0.37007	0.213	1.741	0.083	-0.048	0.788
exp	0.01582	0.012	1.298	0.195	-0.008	0.040
exp2	-0.00024	0.000	-1.014	0.312	-0.001	0.000
govt	0.07722	0.104	0.744	0.458	-0.127	0.282
married	0.07580	0.114	0.663	0.508	-0.149	0.301
lambda	-0.08801	0.153	-0.573	0.567	-0.390	0.214
_cons	1.10905	0.156	7.096	0.000	0.801	1.417

Number of obs = 302

F(10, 291) = 1.81

Prob > F = 0.0589

R-square = 0.0585

Adj R-square = 0.0261

Root MSE = .63292

Full-time, Occupation 6

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
city	0.92945	0.639	1.456	0.152	-0.352	2.211
msa	0.48842	0.485	1.006	0.319	-0.486	1.462
ed2	0.05075	0.532	0.095	0.924	-1.016	1.117
ed3	0.39816	0.662	0.601	0.550	-0.930	1.727
exp	0.00114	0.068	0.017	0.987	-0.136	0.138
exp2	-0.00021	0.001	-0.150	0.881	-0.003	0.003
govt	0.39536	1.187	0.333	0.740	-1.986	2.776
married	-0.32949	0.601	-0.549	0.586	-1.535	0.876
lambda	0.34616	0.745	0.465	0.644	-1.149	1.841
_cons	1.08042	1.103	0.979	0.332	-1.134	3.295

Number of obs = 62

F(9, 52) = 0.49

Prob > F = 0.8733

R-square = 0.0785

Adj R-square = -0.0810

Root MSE = 1.5273

Part-time, Occupation 6

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
city	-0.76862	0.974	-0.789	0.438	-2.776	1.238
msa	0.21341	0.874	0.244	0.809	-1.587	2.014
ed2	0.04790	1.776	0.027	0.979	-3.609	3.705
ed3	-0.25376	2.261	-0.112	0.912	-4.910	4.403
exp	-0.01940	0.122	-0.158	0.875	-0.272	0.233
exp2	-0.00055	0.002	-0.223	0.825	-0.006	0.005
govt	-2.10183	2.183	-0.963	0.345	-6.598	2.395
married	0.70147	1.249	0.561	0.579	-1.872	3.275
lambda	0.17898	2.443	0.073	0.942	-4.852	5.210
_cons	1.39528	1.665	0.838	0.410	-2.033	4.824

Number of obs = 35

F(9, 25) = 0.57

Prob > F = 0.8083

R-square = 0.1703

Adj R-square = -0.1284

Root MSE = 1.9867

Full-time, Occupation 7

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
ed2	-0.27330	0.123	-2.223	0.029	-0.518	-0.028
exp	0.05271	0.018	2.854	0.006	0.016	0.089
exp2	-0.00092	0.000	-2.501	0.015	-0.002	0.000
lambda	-0.35215	0.253	-1.391	0.168	-0.856	0.152
_cons	1.93685	0.306	6.338	0.000	1.328	2.545

Number of obs = 81
 F(4, 76) = 3.30
 Prob > F = 0.0150
 R-square = 0.1481
 Adj R-square = 0.1032
 Root MSE = .49094

Part-time, Occupation 7

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
ed2	0.03688	0.521	0.071	0.955	-6.589	6.662
exp	-0.08419	0.123	-0.687	0.617	-1.641	1.473
exp2	0.00666	0.007	0.937	0.521	-0.084	0.097
lambda	-1.18524	0.602	-1.968	0.299	-8.838	6.468
_cons	1.65056	0.431	3.831	0.163	-3.824	7.125

Number of obs = 6
 F(4, 1) = 2.82
 Prob > F = 0.4164
 R-square = 0.9186
 Adj R-square = 0.5930
 Root MSE = .37672

Full-time, Occupation 8

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
city	-0.05255	0.084	-0.623	0.534	-0.218	0.113
msa	0.11900	0.073	1.622	0.106	-0.025	0.263
ed2	0.27428	0.091	3.026	0.003	0.096	0.453
ed3	0.17862	0.148	1.208	0.228	-0.112	0.470
exp	0.02379	0.011	2.194	0.029	0.002	0.045
exp2	-0.00034	0.000	-1.594	0.112	-0.001	0.000
govt	-0.41954	0.228	-1.842	0.066	-0.868	0.029
married	-0.01041	0.092	-0.114	0.910	-0.191	0.170
lambda	-0.27222	0.160	-1.702	0.090	-0.587	0.042
_cons	1.49547	0.228	6.548	0.000	1.046	1.945

Number of obs = 306

F(9, 296) = 4.48

Prob > F = 0.0000

R-square = 0.1198

Adj R-square = 0.0931

Root MSE = .54589

Part-time, Occupation 8

Inwhr	Coef.	Std. Err.	t	P> t	(95% Conf. Interval)	
city	0.23056	0.378	0.609	0.546	-0.536	0.997
msa	-0.32896	0.312	-1.055	0.298	-0.961	0.303
ed2	0.38590	0.322	1.198	0.238	-0.267	1.039
ed3	0.60837	0.422	1.443	0.157	-0.246	1.463
exp	0.02835	0.049	0.582	0.564	-0.070	0.127
exp2	-0.00039	0.001	-0.386	0.701	-0.002	0.002
govt	-0.09428	0.326	-0.289	0.774	-0.756	0.567
married	0.38813	0.485	0.800	0.429	-0.595	1.371
lambda	0.09937	0.396	0.251	0.803	-0.703	0.902
_cons	0.59620	0.395	1.510	0.139	-0.204	1.396

Number of obs = 47

F(9, 37) = 1.12

Prob > F = 0.3719

R-square = 0.2145

Adj R-square = 0.0234

Root MSE = .84403

APPENDIX H : Appendix to chapter 7

TABLE H7.1 : Maximum likelihood estimates, Male Employment Equation, Australia

Variable	Coeffic	t-ratio		Mean of X
Constant	0.661	(4.925)	*	
MARRIED	0.627	(7.558)	*	0.758
DIVORC	0.145	(1.150)		0.050
E				
RACE	-0.620	-(2.467)	*	0.010
AGE	-0.023	-(9.520)	*	39.941
ED2	0.172	(2.528)	*	0.284
ED3	0.414	(6.719)	*	0.333
ED4	0.287	(2.409)	**	0.066
KID1	0.078	(1.100)		0.180
KID2	0.140	(1.865)	***	0.208
KID3	0.056	(0.536)		0.085
KID4	0.142	(0.772)		0.024
KID5	-0.070	-(0.258)		0.009
MURBAN	0.316	(4.103)	*	0.660
URBAN	0.129	(1.465)		0.219
YINC	0.004	(1.689)	***	11.969
MU(1)	0.256	(14.996)	*	

* significant at 1% level; **significant at 5% level; *** significant at 10% level

Log-Likelihood..... -2021.372
 Restricted (Slopes=0) Log-L. -2158.052
 Chi-Squared (15)..... 273.3608
 Equation significant at 1% level
 Observations = 2662

**TABLE H7.2 : Maximum likelihood estimates, Male Employment Equation,
United States**

Variable	Coeffic	t-ratio		Mean of X
Constant	0.081	(1.012)		
MARRIED	0.995	(19.008)	*	0.646
DIVORC	0.751	(11.498)	*	0.095
E				
RACE	-0.297	-(5.890)	*	0.122
AGE	-0.007	-(4.147)	*	38.336
ED2	0.496	(9.650)	*	0.401
ED3	0.517	(8.427)	*	0.178
ED4	0.857	(14.940)	*	0.287
KID1	0.023	(0.455)		0.186
KID2	0.199	(3.158)	*	0.159
KID3	-0.016	-(0.181)		0.062
KID4	-0.011	-(0.077)		0.016
KID5	-0.367	-(2.312)	**	0.011
CITY	-0.001	-(0.034)		0.231
MSA	0.125	(2.996)	*	0.341
YINC	0.000	-(42.964)	*	2192.700
MU(1)	0.264	(22.013)	*	

Log-Likelihood..... -4205.026
 Restricted (Slopes=0) Log-L. -4844.210
 Chi-Squared (15)..... 1278.369
 Equation significant at 1%