THE UNIVERSITY OF MELBOURNE

Melbourne Institute Working Paper Series

Working Paper No. 16/06

Personal and Job Characteristics Associated with Underemployment

Roger Wilkins

MELBOURNE INSTITUTE
of Applied Economic and Social Research

Personal and Job Characteristics Associated with Underemployment

Roger Wilkins*
Melbourne Institute of Applied Economic and Social Research
The University of Melbourne

Melbourne Institute Working Paper No. 16/06

ISSN 1328-4991 (Print)
ISSN 1447-5863 (Online)
ISBN 0 7340 3216 1

July 2006

* This study was in part funded by the Australian Commonwealth Department of Families, Community Services and Indigenous Affairs (FaCSIA). Thanks are due to Ha Vu and David Black for assistance with data preparation. The views expressed in this paper are those of the author and do not necessarily represent the views of FaCSIA.

Melbourne Institute of Applied Economic and Social Research
The University of Melbourne
Victoria 3010 Australia
Telephone **(03) 8344 2100**
Fax **(03) 8344 2111**
Email **melb-inst@unimelb.edu.au**
WWW Address **http://www.melbourneinstitute.com**

Abstract

Using information collected by the 2001 Household Income and Labour Dynamics in Australia (HILDA) survey, I investigate the factors associated with underemployment, defined as a situation where a part-time employed person would like to work more hours in order to increase income. Multinomial logit models are estimated of labour force status in which underemployment is distinguished from other part-time employment. Effects of a wide range of personal and neighbourhood characteristics are examined, including family background, employment history and local labour market conditions. Underemployment is found to have many predictors in common with unemployment, but also a number of differences. Additional models are estimated on employed persons only that investigate the job characteristics associated with underemployment. Relatively few job characteristics predict underemployment as distinct from other part-time employment.

1. Introduction

Public policy discussion and academic research on excess labour supply in Australia has traditionally focused on unemployment, but there is growing awareness that underemployment is an important component of excess labour supply. Underemployment represents excess labour supply of employed persons, arising when an employed person prefers – and is available for – more hours of work in order to increase wage and salary income. In principle, both part-time and full-time employed persons can be underemployed, but in practice underemployment is usually conceived as excess supply by persons working fewer than full-time hours. For example, the definition of 'time related' underemployment adopted at the Sixteenth International Conference of Labour Statisticians in 1998 restricts underemployment to persons working less than a threshold to be chosen according to 'national circumstances' (International Labour Organization (ILO), 1998), and which the Australian Bureau of Statistics (ABS) has interpreted to be 35 hours per week in its measures of underemployment (ABS, 2002a).

Comparable estimates of the rate of underemployment in Australia have been produced annually by the ABS since 1978. These estimates indicate that underemployment is widespread and has been on the rise relative to unemployment (Figure 1). It is particularly significant that the decline in unemployment since 1993 has not been accompanied by a corresponding decline in underemployment, with the proportion of the labour force underemployed now exceeding the proportion unemployed. While volume measures of unemployment and underemployment show that hours of excess supply associated with unemployment still exceed those associated with unemployment (Wilkins, 2004), it is nonetheless clear that underemployment is a significant feature of the Australian labour market.

The apparent growth in the rate of underemployment – both relative to unemployment and in absolute terms – suggests underemployment ought be of increasing policy concern. In this context, it is valuable to understand the personal and job characteristics associated with underemployment. This is the objective of the current study. Specifically, using the 2001 Household, Income and Labour Dynamics in Australia (HILDA) Survey, I estimate qualitative dependent variable models that distinguish underemployment from other labour force states. Personal characteristics associated with underemployment are investigated via estimation over all persons in the labour force, while employment or job characteristics associated with underemployment are investigated via estimation over employed persons. The

models estimated on persons in the labour force facilitate inferences on the characteristics associated with underemployment vis-à-vis unemployment, other part-time employment and full-time employment. The models estimated on employed persons are informative on the job characteristics associated with underemployment vis-à-vis other part-time employment and full-time employment.

Figure 1: Unemployment and Underemployment

Estimates Derived from ABS Labour Force Surveys

Sources: ABS Cat. No.s 6203.0 & 6265.0. Data are for the month of August from 1978 to 1993 and for the month of September from 1994 to 2005.

Previous Australian research into underemployment has been dominated by efforts to quantify its level (Gregory and Sheehan 1975, Stricker and Sheehan 1980, Ross 1985, Bosworth 1986, Bosworth and Westaway 1987, Denniss 2001, Mitchell and Carlson 2001). Two studies have investigated the factors associated with underemployment. Wooden (1993) describes the key characteristics of the underemployed using unit record data from the May 1991 ABS Labour Force Survey. Estimating probit models of the probability of being underemployed on employed persons only, Wooden finds the underemployed were, compared with the fully employed, more likely to be female, young (less than 25 years of age), single, an immigrant from a non-English speaking country, working in less skilled occupations and working in the recreation, personal services and construction industries. The second study, Doiron (2003), uses matched data on employees and employers in 1995 to estimate ordered probit models of

the difference between desired and actual hours, identifying three separate states: underemployed, fully employed and overemployed. Doiron focuses on the role of demand conditions faced by firms, finding they have little effect on underemployment status.

Aside from its greater currency, the contribution of this study compared with Wooden (1993) and Doiron (2003) stems from the use of a data set with significantly richer information on individuals, the HILDA 2001 survey. The HILDA survey collects information on a wide range of personal and household characteristics, allowing more comprehensive study of the factors associated with underemployment than was possible by Wooden (1993) and Doiron (2003). For example, effects associated with English proficiency, family background, housing circumstances, local labour market conditions, labour market history, work schedule and type of employment contract were not be investigated by Wooden or Doiron, but can all be investigated using the HILDA data. The models I estimate on persons in the labour force also permit a line of inquiry not pursued by Wooden or Doiron, which is whether the factors associated with underemployment are similar to those associated with unemployment or those associated with full employment, or indeed, are quite different altogether.

The plan of the remainder of the paper is as follows. Section 2 discusses the definition of underemployment used. Section 3 investigates personal characteristics associated with underemployment, while Section 4 focuses on job or employment characteristics. Section 5 concludes.

2. Underemployment measure

The notion of underemployment considered in this study is what the ILO calls ‘time-related’ underemployment (ILO, 2000). According to the ILO definition, a person is underemployed if, during the reference period used to define employment, that person is willing to work additional hours (whether this be in the current job or in another job), is available to work additional hours, and worked fewer hours than a threshold ‘to be chosen according to national circumstances’ (and which the ABS has chosen for its measure of underemployment to be 35 hours per week). In common with the definition of unemployment widely used by statistical agencies, there is no mention of wages, implying underemployment is not equivalent to excess labour supply of employed persons. In addition, and unlike unemployment, the ILO definition does not require active search for work. This is most likely because of the potential for a person to be underemployed simply if more hours with the current employer are sought. The ABS definition of underemployment, by imposing the precondition that a person be

employed part-time, also diverges from excess supply of employed persons by ignoring that of full-time workers.

The HILDA survey asks all employed persons how many hours they usually work per week in all jobs, and, furthermore, how many hours per week they would like to work, taking into account the effect this would have on their income. Attempting to remain consistent with the ILO and ABS definitions where possible, underemployment may therefore be defined to occur when employed persons who usually work less than 35 hours per week would like to work more hours than they currently usually work.

While broadly consistent with the ILO definition, this 'HILDA underemployment definition' has two important differences. First, it will potentially include people who express a preference for more hours of work, but who are not available to work more hours. The survey does not ask workers if they are available to work additional desired hours of work, thereby precluding imposition of this requirement. The second important difference from the ILO definition is that the HILDA underemployment definition uses information on *usual* rather than actual weekly hours of work, because actual hours are not recorded in the data set. The most important implication of this is that the HILDA underemployment definition excludes full-time workers who are temporarily working less than 35 hours for labour demand reasons.

Table 1 presents population estimates of the incidence of unemployment and underemployment derived from the 2001 HILDA Survey. In addition to the underemployment rate, the table also presents the rate of involuntary part-time employment. The involuntarily part-time employed are the subset of underemployed workers who would like to work full-time. Separate estimates are presented for this sub-group because, as individuals who would like to change their labour force status, they should perhaps be regarded as the group of underemployed persons of most concern.[1] For this reason, additional models are estimated in Section 3 which distinguish the involuntarily part-time employed from other underemployed persons. These are potentially quite different groups of workers, and indeed it is arguable that, in comparisons with employed persons, the more pertinent comparison for involuntary part-time workers is with the full-time workers they seek to become; whereas other underemployed workers are perhaps more appropriately compared with other part-time

[1] Of course, an alternative approach would be to classify individuals according to the magnitude of the gap between actual and preferred hours. However, consistent with the international literature in this area (e.g., Leppel and Clain, 1988 and Barrett and Doiron, 2001), it was decided that the more pertinent distinction is one based on preferred labour force status (part-time versus full-time).

workers. It is also notable that international research on underemployment has tended to focus on the subset that is involuntarily part-time employed (e.g., Leppel and Clain, 1988 and Ruiz-Quintanilla and Laes, 1996).

Table 1: Population-weighted estimates of unemployment and underemployment – Persons aged 15-64 years in the labour force – 2001 (%)

	Persons		Males		Females	
	Estimate	*SE*	Estimate	*SE*	Estimate	*SE*
Persons in the labour force						
Unemployed	6.71	*0.26*	7.21	*0.37*	6.09	*0.37*
Underemployed	9.53	*0.31*	6.62	*0.36*	13.23	*0.52*
Involuntarily part-time employed	4.49	*0.22*	3.56	*0.27*	5.66	*0.36*
Persons employed part-time						
Underemployed	34.90	*0.93*	45.97	*1.89*	30.27	*1.05*
Involuntarily part-time employed	16.43	*0.72*	24.74	*1.64*	12.96	*0.76*

SE: Standard error.

According to the HILDA Survey, and adopting the HILDA underemployment definition, 9.5% of persons in the labour force where underemployed at the time they were interviewed in 2001. Of these, almost half were involuntarily part-time employed. By comparison, 6.7% were unemployed. While the unemployment rate is in line with the September 2001 ABS estimate (Figure 1), the underemployment rate is approximately 3 percentage points higher. To some extent, this may reflect the failure to explicitly require workers to be available to work additional hours. However, 2001 ABS data show that approximately 12% of part-time workers expressing a preference for additional hours were not available to work those additional hours within a 4-week period (ABS Cat. No. 6265.0), suggesting this cannot fully explain the difference.

Underemployment is more prevalent among females in the labour force than males in the labour force. Approximately 13% of females in the labour force are underemployed, compared with 6.6% of males in the labour force. Part of the explanation for this differential is that part-time employment is a pre-condition for underemployment, and females have a higher rate of part-time employment than males. Indeed, it is significant that the rate of underemployment among part-time workers is 50% higher for males (46%, versus 30% for females), and the rate of involuntary part-time employment for male part-time workers is almost twice that of female part-time workers. Nonetheless, a higher proportion of females in the labour force are involuntarily part-time employed – 5.7% against 3.6% – suggesting that

part of the reason for the higher part-time employment rate of females is in fact less success in securing desired full-time hours.

3. Personal characteristics associated with underemployment

The focus of this section is on the personal characteristics associated with underemployment vis-à-vis unemployment and full employment. For this reason, the sample examined comprises persons in the labour force, and qualitative dependent variable models are estimated that distinguish these states. Specifically, multinomial logit models are estimated of the probability an individual is in each of four labour force states: unemployed, underemployed, otherwise part-time employed and full-time employed. Fully-employed part-time employment is distinguished from full-time employment to eliminate the potential for coefficient estimates for underemployment to be driven by part-time employment status. That is, since part-time employment is a precondition for underemployment, combining fully-employed part-time employment with full-time employment is likely to cause estimates for underemployment to in part reflect the determinants of part-time employment status. Models are estimated for males and females separately on the basis that their determinants of labour force status are likely to be quite different.[2]

The effects of a wide range of factors assessed as potentially affecting labour force status are examined, a number of which have been examined in other Australian labour market studies, for example of unemployment and wages (e.g., see Brooks and Volker 1985, Preston 1997). These factors include age, educational attainment, health, family type, presence of dependent children, indigenous status, place of birth, length of immigrant residency in Australia, English proficiency, family background, housing situation, region of residence, local labour market conditions, neighbourhood socio-economic profile and personal labour market history. Details on the variables are provided in the Appendix.

[2] The well-known problem for multinomial logit models is the requirement of the so-called 'Independence of Irrelevant Alternatives' (IIA) assumption – that the probability of one outcome relative to another is insensitive to the existence of another possible outcome. While there are tests for the validity of the IIA assumption available, such as the Hausman and Small-Hsiao tests, in practice they provide little guidance to violation of the assumption (and in fact produced conflicting evidence for the specifications estimated in this study). However, as one indirect test of IIA, multinomial probit models were estimated for the first specification reported in this paper, and reassuringly produced very similar inferences. While multinomial probit models are attractive for not requiring the IIA assumption, model convergence is often difficult to achieve. Indeed, model convergence was not able to be achieved for the remaining specifications reported in this paper – hence the use of multinomial logit models. Note that an implication of the IIA assumption is that tests of sensitivity of results to the inclusion of persons not in the labour force are redundant.

Most of the variables reflect labour supply factors, either in terms of the nature (productivity) of the labour supplied, or labour supply preferences. However, some dimensions of labour demand are likely to be captured by three of the included variables. The most important variable in this regard is the unemployment rate in the ABS labour force statistical region of the individual's place of residence, which provides a measure of local labour demand conditions.[3] In addition, the variables for region of residence and neighbourhood socio-economic profile may also in part reflect demand factors, although the precise nature of the demand factors they capture is uncertain.

The inclusion of variables for labour market history is relatively novel for labour market studies using Australian data, and reflects the comparative richness of the HILDA data. The variables comprise the proportion of the time the individual has not been employed and the proportion of the time the individual has been unemployed, both in the 2000-2001 financial year and since 15 years of age, as well as a variable for the number of jobs held in the 2000-2001 financial year. These variables may capture 'stigma' or 'scarring' effects associated with past unemployment or non-participation in the labour force. They can also be interpreted as potentially capturing unobserved characteristics likely to affect labour market outcomes, including unobserved human capital, which provides a firmer foundation for attributing causal effects to the other variables found to have statistically significant associations with labour force status.

Table 2 presents mean marginal effects estimates, with means evaluated over all observations in the sample. Reported standard errors are analytic estimates of the standard errors of the mean marginal effects (Bartus, 2005). For each regressor, mean marginal effects sum to zero across the four outcome categories, but for the purposes of statistical inference the estimates are reported for all four outcomes.

Point estimates of effects of characteristics on likelihood of unemployment are generally consistent with expectations and prior research, although they are not always statistically significant.[4] Effects that are statistically significant are found for the variables for age, educational attainment and disability: youth, disability and relatively low educational attainment elevate the probability of unemployment. Labour market history is also associated

[3] There were 63 of these regions throughout Australia in 2001. See ABS (2002b) for details on the regions.

[4] In part, this refects the inclusion of variables for labour market history; the omission of these variables (in analysis not reported) increases the statistical significance of several variables – most notably, the variables for the local unemployment rate and neighbourhood socioeconomic profile.

with substantial implications for likelihood of unemployment. As might be expected, the unemployment probability is increasing in time spent not employed, and past unemployment has stronger effects than past non-participation. The estimates also imply that more recent experiences of non-employment are associated with greater effects than more distant ones. To some extent, labour market history effects will represent actual effects of past labour market outcomes, but – as noted earlier – they are also likely to be capturing the effects of unobserved characteristics that influence both past and current labour force status.

Mean marginal effects estimates for underemployment imply some commonalities in determinants with both unemployment and 'fully-employed' part-time employment ('other part-time employment'). Considering first age effects, other part-time employment is strongly associated with the 15-24 years age group, an association also evident for underemployment. However, the extent of the effect is smaller for underemployment than other part-time employment, placing underemployment approximately midway between unemployment and other part-time employment in terms of this age effect. For example, being aged 15-24 years on average acts to increase the probability of male unemployment by 3-4 percentage points relative to 25-54 year olds, compared with 5 percentage points for underemployment and 7-9 percentage points for other part-time employment.

Part-time employment is also strongly associated with being aged 55-64 years. For both males and females in this age group, the probability of part-time employment (columns 2 and 3 combined) is, all else equal, about the same as for their 15-24 year old counterparts. However, there is a significant distinction between males and females. For females, the probability of underemployment is 8 percentage points lower for 55-64 years compared with 15-24 year olds, matched by a correspondingly greater probability of other part-time employment. For males, by contrast, the probability of underemployment is, all else equal, approximately the same for the two age groups. The implication is that increased part-time employment of males in this age group compared with prime-age males is not all voluntary.

Table 2a: Effects of personal characteristics on labour force status – Males

	Unemployed		Underemployed		Other part-time employed		Full-time employed	
	MME	SE	MME	SE	MME	SE	MME	SE
Age group (15-24 omitted*)*								
25-34	-0.032**	0.007	-0.044**	0.008	-0.071**	0.009	0.148**	0.013
35-44	-0.037**	0.008	-0.052**	0.009	-0.088**	0.01	0.177**	0.014
45-54	-0.039**	0.008	-0.051**	0.009	-0.079**	0.01	0.169**	0.013
55-64	-0.032**	0.009	-0.015	0.013	-0.004	0.014	0.051**	0.018
Educational attainment (Not completed high school omitted*)*								
Degree	-0.032**	0.008	-0.032**	0.01	-0.010	0.012	0.074**	0.015
Other post-school	-0.012*	0.007	-0.024**	0.008	-0.027**	0.009	0.063**	0.012
High school	-0.011	0.008	0.012	0.011	0.000	0.012	-0.001	0.016
Disability	0.023**	0.011	0.024*	0.014	0.041**	0.016	-0.088**	0.02
Family type (Single omitted*)*								
Couple - no dep children	-0.001	0.009	-0.024**	0.01	0.029**	0.014	-0.004	0.015
Sole parent	0.038	0.033	-0.013	0.022	0.107**	0.053	-0.132**	0.056
Couple - dep children	0.006	0.015	-0.049**	0.019	0.015	0.021	0.029	0.027
Presence of dependent children (Youngest aged under 5 omitted*)*								
Youngest aged 5-15	0.009	0.013	0.039**	0.019	0.037*	0.019	-0.086**	0.022
Youngest aged 16-24	0.005	0.018	0.103**	0.038	0.056*	0.03	-0.164**	0.039
Number of dependent children	-0.008	0.005	0.014**	0.005	0.004	0.006	-0.009	0.008
Place of birth and Indigenous status (Other native-born omitted*)*								
Indigenous	0.051*	0.029	0.027	0.03	-0.027	0.026	-0.052	0.046
ESB immigrant	0.043*	0.024	-0.019	0.02	-0.006	0.025	-0.017	0.033
NESB immigrant	0.031*	0.017	0.035	0.024	0.042*	0.025	-0.108**	0.031
Years since mig - ESB	-0.001	0.001	0.000	0.001	0.000	0.001	0.001	0.001
Years since mig - NESB	0.000	0.001	-0.002**	0.001	-0.002**	0.001	0.004**	0.001
Poor English	0.041	0.03	-0.025	0.029	-0.019	0.033	0.003	0.045
Family background								
Father emp when 14	0.000	0.008	-0.031**	0.011	-0.030**	0.013	0.061**	0.016
Mother emp when 14	-0.003	0.006	0.013	0.008	-0.018**	0.008	0.008	0.011
Both parents present when 14	0.002	0.007	0.009	0.009	-0.001	0.01	-0.009	0.013
Housing status (No rent or mortgage omitted*)*								
Renting	0.004	0.008	0.002	0.01	-0.025**	0.01	0.019	0.014
Paying mortgage	-0.006	0.008	-0.006	0.009	-0.025**	0.009	0.037**	0.012
Region of residence (Major city omitted*)*								
Inner regional	-0.004	0.007	0.000	0.009	-0.012	0.009	0.015	0.012
Outer regional or remote	-0.007	0.008	0.000	0.011	-0.026**	0.01	0.033**	0.015
Local unemployment rate	0.086	0.167	0.361*	0.198	0.015	0.212	-0.463	0.282
SEIFA decile	-0.001	0.001	0.000	0.001	-0.003*	0.001	0.003	0.002
Labour market history								
Not emp - life	0.049**	0.023	0.094**	0.03	0.111**	0.034	-0.253**	0.048
Unemp - life	0.101**	0.032	-0.004	0.049	-0.163**	0.078	0.066	0.089
Not emp - year	0.081**	0.014	0.054**	0.025	0.094**	0.026	-0.228**	0.039
Unemp - year	0.092**	0.016	0.068**	0.032	-0.071*	0.041	-0.088	0.056
Number of jobs - year	-0.026**	0.006	0.027**	0.005	0.014**	0.006	-0.015*	0.008
Sample size: 4775	Log-likelihood: -2645.41				Pseudo R-sq: 0.276			

Note: MME: Mean Marginal Effect. SE: Standard error. ** and * indicate significance at the 5 % and 10% levels, respectively.

Table 2b: Effects of personal characteristics on labour force status – Females

	Unemployed		Underemployed		Other part-time employed		Full-time employed	
	MME	SE	MME	SE	MME	SE	MME	SE
Age group (15-24 omitted*)*								
25-34	-0.033**	0.007	-0.066**	0.014	-0.111**	0.022	0.210**	0.023
35-44	-0.037**	0.008	-0.059**	0.015	-0.072**	0.023	0.167**	0.023
45-54	-0.024**	0.009	-0.087**	0.014	-0.052**	0.025	0.163**	0.025
55-64	-0.042**	0.008	-0.079**	0.016	0.086**	0.034	0.035	0.033
Educational attainment (Not completed high school omitted*)*								
Degree	-0.020**	0.008	-0.052**	0.013	-0.061**	0.018	0.133**	0.02
Other post-school	-0.016**	0.007	-0.034**	0.012	-0.034**	0.017	0.085**	0.018
High school	-0.025**	0.007	-0.019	0.015	0.013	0.023	0.031	0.024
Disability	0.009	0.012	0.027	0.022	0.049*	0.027	-0.084**	0.026
Family type (Single omitted*)*								
Couple - no dep children	-0.011	0.008	-0.028*	0.015	0.122**	0.022	-0.082**	0.019
Sole parent	-0.005	0.014	0.043	0.033	0.291**	0.041	-0.329**	0.027
Couple - dep children	-0.027*	0.014	0.005	0.024	0.392**	0.03	-0.370**	0.031
Presence of dependent children (Youngest aged under 5 omitted*)*								
Youngest aged 5-15	-0.001	0.01	-0.020	0.015	-0.123**	0.019	0.144**	0.022
Youngest aged 16-24	0.031*	0.018	-0.064**	0.018	-0.118**	0.026	0.152**	0.033
Number of dependent children	0.005	0.005	0.018**	0.008	0.025**	0.011	-0.048**	0.013
Place of birth and Indigenous status (Other native-born omitted*)*								
Indigenous	0.039*	0.024	-0.026	0.032	0.039	0.054	-0.052	0.055
ESB immigrant	0.051*	0.028	-0.037	0.031	-0.067	0.043	0.052	0.045
NESB immigrant	0.026	0.019	0.058*	0.033	-0.137**	0.032	0.052	0.037
Years since mig - ESB	-0.001	0.001	0.002	0.001	0.002	0.002	-0.003*	0.002
Years since mig - NESB	0.000	0.001	-0.001	0.001	0.003*	0.002	-0.002	0.001
Poor English	-0.001	0.022	-0.051	0.041	-0.079	0.077	0.131*	0.078
Family background								
Father emp when 14	-0.010	0.008	-0.016	0.016	-0.044*	0.023	0.071**	0.022
Mother emp when 14	-0.010	0.006	0.003	0.011	0.010	0.014	-0.004	0.014
Both parents present when 14	-0.009	0.008	-0.020	0.014	0.058**	0.018	-0.029	0.019
Housing status (No rent or mortgage omitted*)*								
Renting	-0.002	0.008	0.003	0.016	-0.079**	0.02	0.078**	0.021
Paying mortgage	0.003	0.007	0.003	0.013	-0.078**	0.015	0.071**	0.017
Region of residence (Major city omitted*)*								
Inner regional	-0.013*	0.007	0.007	0.013	0.018	0.017	-0.012	0.018
Outer regional or remote	-0.002	0.009	0.002	0.017	-0.045**	0.021	0.044**	0.022
Local unemployment rate	0.284*	0.167	0.268	0.294	-0.475	0.38	-0.077	0.387
SEIFA decile	0.002	0.001	-0.003*	0.002	0.002	0.003	0.000	0.003
Labour market history								
Not emp - life	0.027*	0.014	0.068**	0.027	0.156**	0.035	-0.251**	0.038
Unemp - life	0.089**	0.03	0.269**	0.079	-0.145	0.152	-0.212	0.15
Not emp - year	0.083**	0.011	0.047*	0.028	0.122**	0.04	-0.253**	0.047
Unemp - year	0.052**	0.013	0.118**	0.047	-0.181**	0.087	0.012	0.092
Number of jobs - year	-0.038**	0.006	0.019**	0.008	0.039**	0.011	-0.020*	0.011
Sample size: 4186	Log-likelihood: -3926.42				Pseudo R-sq: 0.193			

Note: MME: Mean Marginal Effect. SE: Standard error. ** and * indicate significance at the 5 % and 10% levels, respectively.

Turning to the estimates for the educational attainment variables, for males, education beyond high school is associated with reduced probabilities of both unemployment and underemployment. Particularly notable is that, while a bachelor's degree has no significant effect on the probability of other part-time employment, it acts to decrease the probability of underemployment by the same extent it acts to decrease the probability of unemployment. Non-degree post-school qualifications, by contrast, are associated with similar negative effects on the probabilities of underemployment and other part-time employment. This can be interpreted as implying that the effects of non-degree post-school qualifications on likelihood of underemployment simply reflect their effects on the likelihood of part-time employment in general, rather than on the likelihood of underemployment itself. A bachelor's degree, by contrast, does decrease the probability of male underemployment vis-à-vis other part-time employment (or indeed full-time employment). For females, effects of educational attainment on underemployment appear to be very similar to effects on part-time employment, implying educational attainment is not a significant predictor of underemployment as distinct from other part-time employment.

Consistent with a negative labour supply effect, disability is associated with an increased probability of (fully employed) part-time employment for both males and females. Not so readily explained by labour supply preferences is that disability is also associated with increased probabilities of unemployment and underemployment. While these effects are smaller in magnitude than those for other part-time employment, and are only statistically significant for males, it is reasonably clear that underemployment has more in common with unemployment than other part-time employment when it comes to the effects of disability.

An individual's family structure has substantial implications for full-time and part-time employment status, more so for females than males. Consistent with (well-known) labour supply effects of caring responsibilities, the presence of dependent children substantially decreases the probability of full-time employment for females, especially when the youngest child is below school age. This effect is slightly stronger for partnered females than sole parent females. For males, by contrast, dependent children only decrease the probability of full-time employment for sole parents. Also in contrast to females is that the probability of male full-time employment is decreasing in the age of the youngest child.

These effects on the probability of full-time employment largely translate into corresponding (opposite) effects on part-time employment, and indeed – consistent with effects reflecting labour supply responses – family structure is not associated with significant effects on

probability of unemployment. However, seemingly at odds with the labour supply explanation is that significant effects are evident with respect to underemployment. Coupled males are, all else equal, less likely to be underemployed, while the probability of male underemployment is increasing in the number of dependent children and the age of the youngest child. The female probability of underemployment is also increasing in the number of dependent children. However, this effect may not reflect labour demand constraints, but rather constraints created by caring responsibilities, since individuals are not required by our underemployment definition to be *available* for preferred hours of work.

Indigenous status and place of birth are not associated with significant effects on underemployment status, although point estimates imply non-English speaking background immigrants have an elevated probability of underemployment, an effect that is diminishing in years since migration. Family background, as measured by the included dummy indicator variables for parents' employment status and presence when the respondent was 14 years of age, appears to have little effect on underemployment status. The notable exception is that father's employment status is associated with significant effects for males. All else equal, a male reporting that when he was 14 years of age he resided with his father and his father was employed has a 6 percentage point higher probability of full-time employment, and correspondingly lower probabilities of both underemployment and other part-time employment, than a male reporting his father was not present and/or was not employed.

The need to meet accommodation costs, in the form of rent or mortgage repayments, is associated with an increased probability of full-time employment at the expense of fully-employed part-time employment. Consistent with this being a labour supply effect, such financial obligations are not associated with an effect on probability of unemployment or underemployment. Residing in an outer regional or remote area is similarly associated with full-time employment at the expense of full-employed part-time employment, also having no effect on unemployment and underemployment status. The local unemployment rate does not exert statistically significant effects on unemployment and underemployment probabilities, but it is notable that point estimates suggest demand conditions are at least as important to underemployment as they are to unemployment. There is little evidence of 'neighbourhood effects' on likelihood of being either unemployed or underemployed, as reflected by marginal effects estimates for SEIFA decile and, indeed, the local unemployment rate.

Labour market history is an important predictor of current labour force status. As noted, the probability of unemployment is increasing in the proportion of time spent not employed, an

effect that is greater the larger the share of that time was spent unemployed. By way of contrast, while the probability of fully-employed part-time employment is increasing in time spent out of the labour force, it is either not affected, or slightly decreased, by time spent unemployed. In addition, the probability of unemployment is decreasing in the number of jobs held in the preceding financial year, while the probability of fully-employed part-time employment is increasing in the number of preceding-year jobs.

Estimates for underemployment imply effects that are generally closer to those for unemployment than other part-time employment, but with several important differences. First, lifetime non-employment is associated with a stronger positive effect on the probability of underemployment than on the probability of unemployment, but preceding-year non-employment is associated with a weaker positive effect. One could speculate that this derives from underemployment in some cases representing a transition phase from a long period of non-employment to full employment.

Second, differences arise with respect to unemployment history, which also markedly differs in effects between males and females. For males, while preceding-year unemployment acts to increase the probability of underemployment (albeit to a lesser extent than it increases the probability of unemployment), lifetime unemployment has no different an effect than non-participation – that is, it does not matter whether non-employment arose from non-participation or unemployment. This places underemployment squarely in the middle of unemployment and other part-time employment. For females, by contrast, both lifetime unemployment and preceding-year unemployment have considerably stronger effects on the probability of underemployment than on the probability of current unemployment. It is hard to conceive why past unemployment should be a stronger predictor of underemployment than unemployment, but this appears to be the case for females.

A third notable difference between underemployment and unemployment is that the probability of underemployment is, like other part-time employment, a positive function of the number of jobs held in the preceding financial year, compared with a negative relationship for unemployment. For males, the magnitude of the effect for underemployment is twice that for other part-time unemployment, each job increasing the probability of underemployment by 2.7 percentage points and increasing the probability of other part-time employment by 1.4 percentage points. This possibly to some extent reflects a recent history of “job-hopping” by underemployed workers in their (as yet unsuccessful) searches for adequate hours of employment.

Involuntary part-time employment

Among the underemployed, a potentially important distinction is that between underemployed workers wishing to remain working part-time hours and underemployed workers seeking full-time hours. These two groups may be quite different in their characteristics, and the latter group, often referred to as the involuntarily part-time employed (e.g., Leppel and Clain 1988, Jacobs 1993), is likely to be of greater concern to policy-makers than underemployed workers wishing to remain part-time. It is therefore of interest to consider the predictors of involuntary part-time employment vis-à-vis other underemployment. Furthermore, while for underemployed workers wishing to remain part-time the appropriate 'fully employed' reference group is other part-time workers, for the involuntarily part-time employed, comparisons with full-time workers would seem to be more appropriate.

On this basis, models are estimated that distinguish involuntary part-time employment from other underemployment.[5] The cost of this distinction is a greater number of estimates to contend with and reduced precision of the estimates. Table 3 reports the mean marginal effects estimates. Several striking differences in the characteristics associated with the two types of underemployment are evident. Holding all else constant, involuntary part-time employment differs little by age, with the exception that 45-64 year old females are somewhat less likely to be in this category than younger females. Age effects on underemployment are therefore primarily driven by those seeking part-time hours. With regard to disability, point estimates, while not statistically significant, suggest that the adverse effects of disability are restricted to involuntary part-time employment.

As might be expected, for females family type has different implications for the two types of underemployment, but there are also differences for males. Being partnered and without dependent children decreases the probability of involuntary part-time employment for both males and females, but not the probability of other underemployment. For males, being single elevates the probability of other underemployment, but not involuntary part-time employment. For females, dependent children elevate the probability of other underemployment, but not involuntary part-time employment.

Significantly, the probability of involuntary part-time employment is strongly positively associated with the local unemployment rate for males. The point estimate of the mean marginal effect for females also implies a sizeable positive association, but it is not

[5] In all other respects, the models are the same as those reported in Table 2.

statistically significant. By contrast, the local unemployment rate appears to be irrelevant to other underemployment.

Table 3a: Effects of personal characteristics on labour force status – Distinguishing involuntary part-time employment from other underemployment – Males

	Unemployed		Involuntarily part-time employed		Other underemployed		Other part-time employed		Full-time employed	
	MME	SE	MME	SE	MME	SE	MME	SE	MME	SE
Age group (15-24 omitted*)*										
25-34	-0.033**	0.007	-0.015**	0.007	-0.025**	0.005	-0.071**	0.009	0.144**	0.013
35-44	-0.038**	0.008	-0.010	0.008	-0.037**	0.006	-0.089**	0.01	0.174**	0.014
45-54	-0.040**	0.008	-0.014*	0.008	-0.031**	0.006	-0.081**	0.01	0.165**	0.014
55-64	-0.033**	0.009	-0.004	0.011	-0.004	0.009	-0.006	0.014	0.047**	0.019
Educational attainment (Not completed high school omitted*)*										
Degree	-0.033**	0.008	-0.013*	0.008	-0.014**	0.007	-0.011	0.011	0.071**	0.015
Other post-school	-0.012*	0.007	-0.007	0.007	-0.015**	0.006	-0.027**	0.009	0.060**	0.012
High school	-0.011	0.008	0.010	0.009	0.005	0.007	0.000	0.012	-0.004	0.016
Disability	0.023**	0.011	0.019*	0.011	0.005	0.01	0.041**	0.016	-0.089**	0.02
Family type (Single omitted*)*										
Couple - no dep children	0.000	0.009	-0.014**	0.007	-0.015**	0.006	0.032**	0.014	-0.002	0.015
Sole parent	0.040	0.033	0.003	0.026	-0.026**	0.007	0.111**	0.053	-0.128**	0.058
Couple - dep children	0.006	0.015	-0.010	0.012	-0.051**	0.022	0.017	0.02	0.038	0.029
Presence of dependent children (Youngest aged under 5 omitted*)*										
Youngest aged 5-15	0.005	0.013	-0.007	0.009	0.079**	0.035	0.028	0.02	-0.105**	0.028
Youngest aged 16-24	-0.002	0.018	-0.020**	0.01	0.178**	0.072	0.041	0.031	-0.198**	0.054
No. of dependent children	-0.008	0.005	0.000	0.005	0.011**	0.003	0.005	0.006	-0.007	0.008
Place of birth and Indigenous status (Other native-born omitted*)*										
Indigenous	0.048*	0.028	0.049	0.033	-0.007	0.014	-0.029	0.025	-0.061	0.047
ESB immigrant	0.044*	0.025	-0.002	0.017	-0.018	0.011	-0.005	0.025	-0.019	0.033
NESB immigrant	0.031*	0.017	0.020	0.018	0.019	0.019	0.042	0.025	-0.112**	0.031
Years since mig - ESB	-0.001	0.001	-0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Years since mig - NESB	0.000	0.001	0.000	0.001	-0.002**	0.001	-0.002**	0.001	0.004**	0.001
Poor English	0.042	0.03	0.001	0.027	-0.030**	0.002	-0.017	0.034	0.004	0.046
Family background										
Father emp when 14	0.000	0.008	-0.012	0.009	-0.016**	0.007	-0.030**	0.013	0.059**	0.016
Mother emp when 14	-0.004	0.006	0.002	0.006	0.011*	0.006	-0.018**	0.008	0.009	0.011
Both parents when 14	0.002	0.007	0.018**	0.006	-0.011	0.007	-0.001	0.01	-0.007	0.013
Housing status (No rent or mortgage omitted*)*										
Renting	0.004	0.008	0.006	0.008	-0.002	0.007	-0.026**	0.01	0.017	0.014
Paying mortgage	-0.006	0.008	0.002	0.007	-0.006	0.005	-0.026**	0.009	0.035**	0.012
Region of residence (Major city omitted*)*										
Inner regional	-0.003	0.007	0.002	0.007	-0.001	0.006	-0.012	0.009	0.014	0.012
Outer regional or remote	-0.007	0.008	0.013	0.01	-0.011	0.007	-0.025**	0.01	0.031**	0.015
Local unemployment rate	0.088	0.167	0.479**	0.151	-0.117	0.135	0.015	0.212	-0.464*	0.281
SEIFA decile	0.000	0.001	0.000	0.001	0.000	0.001	-0.003*	0.001	0.003	0.002
Labour market history										
Not emp - life	0.051**	0.023	0.027	0.025	0.063**	0.018	0.112**	0.034	-0.253**	0.048
Unemp - life	0.097**	0.032	0.027	0.038	-0.023	0.032	-0.166**	0.078	0.065	0.088
Not emp - year	0.080**	0.014	0.052**	0.019	-0.001	0.017	0.092**	0.026	-0.224**	0.039
Unemp - year	0.092**	0.016	0.024	0.023	0.042*	0.022	-0.070*	0.041	-0.088	0.055
Number of jobs - year	-0.026**	0.006	0.021**	0.003	0.006	0.004	0.014**	0.006	-0.014*	0.008
Sample size: 4775	Log-likelihood: -2784.49				Pseudo R-sq: 0.281					

Note: MME: Mean Marginal Effect. SE: Standard error. ** and * indicate significance at the 5 % and 10% levels, respectively.

Table 3b: Effects of personal characteristics on labour force status – Distinguishing involuntary part-time employment from other underemployment – Females

	Unemployed		Involuntarily part-time employed		Other underemployed		Other part-time employed		Full-time employed	
	MME	SE	MME	SE	MME	SE	MME	SE	MME	SE
Age group (15-24 omitted*)*										
25-34	-0.034**	0.007	-0.015	0.01	-0.048**	0.011	-0.113**	0.022	0.210**	0.023
35-44	-0.037**	0.008	-0.016	0.01	-0.040**	0.012	-0.074**	0.023	0.167**	0.023
45-54	-0.024**	0.009	-0.034**	0.009	-0.052**	0.011	-0.054**	0.025	0.164**	0.025
55-64	-0.043**	0.008	-0.035**	0.01	-0.042**	0.014	0.083**	0.034	0.036	0.033
Educational attainment (Not completed high school omitted*)*										
Degree	-0.020**	0.008	-0.019**	0.01	-0.032**	0.01	-0.062**	0.018	0.132**	0.02
Other post-school	-0.017**	0.007	-0.002	0.009	-0.030**	0.01	-0.035**	0.017	0.084**	0.018
High school	-0.025**	0.007	0.007	0.012	-0.023**	0.011	0.011	0.023	0.030	0.024
Disability	0.009	0.012	0.023	0.016	0.003	0.017	0.049*	0.027	-0.083**	0.026
Family type (Single omitted*)*										
Couple - no dep children	-0.012	0.008	-0.020**	0.008	-0.002	0.014	0.119**	0.022	-0.084**	0.019
Sole parent	-0.007	0.014	0.003	0.019	0.070**	0.036	0.268**	0.045	-0.335**	0.026
Couple - dep children	-0.028*	0.014	-0.020	0.016	0.040**	0.02	0.385**	0.031	-0.377**	0.03
Presence of dependent children (Youngest aged under 5 omitted*)*										
Youngest aged 5-15	-0.001	0.01	-0.014	0.011	-0.011	0.012	-0.121**	0.019	0.146**	0.022
Youngest aged 16-24	0.031*	0.018	-0.025*	0.013	-0.043**	0.012	-0.118**	0.026	0.155**	0.033
No. of dependent children	0.005	0.005	0.000	0.007	0.013**	0.006	0.027**	0.011	-0.045**	0.013
Place of birth and Indigenous status (Other native-born omitted*)*										
Indigenous	0.039*	0.023	-0.015	0.02	-0.008	0.027	0.037	0.054	-0.053	0.055
ESB immigrant	0.050*	0.028	0.022	0.029	-0.052**	0.019	-0.069	0.042	0.049	0.046
NESB immigrant	0.026	0.019	0.063**	0.027	-0.004	0.023	-0.137**	0.032	0.053	0.037
Years since mig - ESB	-0.001	0.001	0.000	0.001	0.003**	0.001	0.002	0.002	-0.003*	0.002
Years since mig - NESB	0.000	0.001	0.000	0.001	0.000	0.001	0.003*	0.002	-0.002	0.001
Poor English	-0.001	0.022	-0.023	0.022	-0.027	0.038	-0.078	0.078	0.128*	0.078
Family background										
Father emp when 14	-0.010	0.008	0.008	0.009	-0.026*	0.015	-0.045*	0.023	0.073**	0.022
Mother emp when 14	-0.009	0.006	0.000	0.007	0.003	0.009	0.010	0.014	-0.004	0.014
Both parents when 14	-0.009	0.008	-0.029**	0.01	0.008	0.011	0.059**	0.018	-0.030	0.019
Housing status (No rent or mortgage omitted*)*										
Renting	-0.002	0.008	0.008	0.011	-0.008	0.012	-0.078**	0.02	0.080**	0.021
Paying mortgage	0.003	0.007	-0.002	0.009	0.006	0.01	-0.078**	0.015	0.071**	0.017
Region of residence (Major city omitted*)*										
Inner regional	-0.013*	0.007	0.016	0.01	-0.009	0.01	0.018	0.017	-0.012	0.018
Outer regional or remote	-0.002	0.009	0.005	0.012	-0.002	0.013	-0.045**	0.021	0.044**	0.022
Local unemployment rate	0.287*	0.167	0.234	0.197	0.056	0.235	-0.484	0.38	-0.093	0.386
SEIFA decile	0.002	0.001	-0.003**	0.001	0.000	0.002	0.002	0.003	0.000	0.003
Labour market history										
Not emp - life	0.028*	0.014	0.031*	0.019	0.042*	0.022	0.153**	0.035	-0.253**	0.038
Unemp - life	0.090**	0.03	0.129**	0.043	0.119*	0.067	-0.139	0.153	-0.199	0.151
Not emp - year	0.083**	0.011	0.003	0.02	0.044**	0.021	0.123**	0.04	-0.253**	0.047
Unemp - year	0.053**	0.013	0.072**	0.028	0.036	0.038	-0.178**	0.088	0.017	0.093
Number of jobs - year	-0.038**	0.006	0.004	0.005	0.016**	0.006	0.039**	0.011	-0.021*	0.011
Sample size: 4186	Log-likelihood: -4263.66		Pseudo R-sq: 0.189							

Note: MME: Mean Marginal Effect. SE: Standard error. ** and * indicate significance at the 5 % and 10% levels, respectively.

Differences between involuntary part-time employment and other underemployment in the effects of labour market history are also evident. For males, non-employment in the preceding year is a significant predictor of involuntary part-time employment, but not other underemployment; while lifetime non-employment is a significant predictor of other

underemployment, but not involuntary part-time employment. With respect to the number of jobs in the preceding year, its positive association with male underemployment is restricted to involuntary part-time employment. For females, estimates for non-employment and unemployment in the preceding year imply that only unemployment increases the probability of current involuntary part-time employment, whereas both unemployment and non-participation increase the probability of current other underemployment. Also notable for females is that a significant positive association between preceding year number of jobs arises for other underemployment.

4. Employment characteristics associated with underemployment

The question of the employment or job characteristics associated with underemployment is investigated by estimating models of the determinants of underemployment given a person is employed. In addition to the variables included in the models estimated in Section 3, variables are included for a range of employment characteristics, including the nature of the employment arrangement (e.g., casual, fixed term contract), work schedule, tenure of employment, firm size, occupation, industry and the wage rate.[6]

Table 4 reports mean marginal effects estimates for employment characteristics. All explanatory variables included in the specifications estimated in Section 3 are retained, but estimates for these variables are not reported. The estimates imply no significant effects on probability of underemployment versus other part-time employment for many of the characteristics. Perhaps particularly surprising is the result for casual employment: while casual employment is associated with an elevated probability of underemployment, it is also associated with a similar increase in the probability of other part-time employment. The absence of a wage effect is also somewhat surprising, and is at odds with findings of simple comparisons of means for underemployed and other workers (Doiron, 2003).

[6] Models distinguishing between involuntary part-time employment and other underemployment are not reported in this section.

Table 4a: Effects of employment characteristics on labour force status of employed persons – Males

	Underemployed		Other part-time employed		Full-time employed	
	MME	SE	MME	SE	MME	SE
Union member	-0.009	0.01	0.000	0.01	0.009	0.011
Regular schedule (M-F)	-0.040**	0.008	-0.032**	0.009	0.072**	0.011
Casual	0.128**	0.019	0.147**	0.022	-0.275**	0.023
Labour hire	-0.011	0.016	-0.006	0.019	0.018	0.02
Fixed term contract	-0.019	0.014	-0.001	0.017	0.020	0.017
Self employed	0.069**	0.019	0.063**	0.02	-0.132**	0.018
Tenure – employer (yrs)	-0.001	0.001	0.000	0.001	0.001	0.001
Tenure – occupation (yrs)	-0.001**	0.001	0.000	0.001	0.001*	0.001
Size of firm/employer (*Large* omitted)						
Small	0.013	0.01	0.009	0.011	-0.022*	0.013
Medium	0.007	0.012	0.002	0.013	-0.008	0.015
Public sector	-0.011	0.016	0.037*	0.021	-0.027	0.02
Occupation (*Professional* omitted)						
Managerial	-0.012	0.021	-0.001	0.02	0.012	0.02
Associate professional	-0.002	0.018	-0.026*	0.016	0.028	0.018
Advanced clerical	0.022	0.059	0.091	0.08	-0.113	0.083
Intermediate clerical	0.065**	0.025	-0.005	0.019	-0.061**	0.024
Elementary clerical	0.107**	0.032	0.030	0.025	-0.137**	0.033
Trade	0.035*	0.02	-0.015	0.016	-0.020	0.02
Intermediate prod.	0.040*	0.024	0.024	0.023	-0.064**	0.024
Labourer	0.045**	0.023	0.044*	0.023	-0.089**	0.026
Industry (*Retail trade* omitted)						
Agriculture	-0.027**	0.013	-0.061**	0.011	0.088**	0.014
Accommodation	0.030	0.019	-0.012	0.016	-0.018	0.023
Communication	-0.009	0.023	-0.047**	0.017	0.056**	0.023
Construction	0.015	0.016	-0.049**	0.012	0.034**	0.016
Culture	0.011	0.02	-0.004	0.019	-0.007	0.023
Education	0.132**	0.043	-0.003	0.024	-0.129**	0.04
Electricity	0.028	0.053	-0.085**	0.004	0.057	0.053
Finance	0.011	0.041	-0.046**	0.023	0.036	0.036
Government	0.030	0.032	-0.060**	0.015	0.030	0.03
Health	0.101**	0.035	-0.008	0.022	-0.093**	0.033
Manufacturing	-0.025**	0.012	-0.051**	0.011	0.075**	0.014
Mining	-0.040	0.026	-0.035	0.024	0.075**	0.027
Personal service	0.005	0.021	-0.016	0.018	0.011	0.023
Property	0.026	0.017	-0.030**	0.013	0.005	0.018
Transport	-0.015	0.015	-0.050**	0.012	0.065**	0.016
Wholesale trade	-0.030**	0.015	-0.055**	0.012	0.085**	0.016
Hourly wage	0.000	0	0.000**	0	-0.001*	0
Sample size: 4202	Log-likelihood: -1408.32			Pseudo R-sq: 0.375		

Note: All explanatory variables included in the models estimated in Section 3 are retained, but are not reported here. MME: Mean Marginal Effect. SE: Standard error. ** and * indicate significance at the 5 % and 10% levels, respectively.

Table 4b: Effects of employment characteristics on labour force status of employed persons – Females

	Underemployed		Other part-time employed		Full-time employed	
	MME	SE	MME	SE	MME	SE
Union member	0.016	0.015	-0.066**	0.018	0.050**	0.017
Regular schedule (M-F)	-0.064**	0.013	-0.065**	0.017	0.129**	0.016
Casual	0.172**	0.019	0.163**	0.021	-0.334**	0.019
Labour hire	-0.027	0.024	-0.066*	0.037	0.093**	0.037
Fixed term contract	-0.014	0.022	0.004	0.028	0.010	0.024
Self employed	0.068**	0.027	0.029	0.03	-0.097**	0.026
Tenure – employer (yrs)	-0.003**	0.001	0.002	0.002	0.002	0.001
Tenure – occupation (yrs)	-0.001	0.001	0.001	0.001	0.000	0.001
Size of firm/employer (*Large* omitted)						
Small	0.030**	0.015	0.034*	0.02	-0.064**	0.02
Medium	-0.024	0.016	-0.003	0.022	0.027	0.02
Public sector	0.029	0.02	-0.028	0.023	-0.001	0.021
Occupation (*Professional* omitted)						
Managerial	-0.059	0.038	-0.060	0.04	0.119**	0.036
Associate professional	0.008	0.026	-0.057*	0.029	0.049*	0.026
Advanced clerical	0.069*	0.039	0.028	0.04	-0.097**	0.032
Intermediate clerical	0.065**	0.024	0.043	0.028	-0.109**	0.024
Elementary clerical	0.130**	0.037	0.090**	0.039	-0.221**	0.031
Trade	0.040	0.041	-0.024	0.048	-0.015	0.042
Intermediate prod.	0.160**	0.06	-0.043	0.056	-0.117**	0.047
Labourer	0.148**	0.041	0.027	0.041	-0.175**	0.033
Industry (*Retail trade* omitted)						
Agriculture	-0.055*	0.03	0.009	0.046	0.045	0.044
Accommodation	-0.012	0.022	-0.021	0.035	0.033	0.034
Communication	-0.040	0.037	-0.057	0.053	0.097*	0.051
Construction	-0.039	0.038	0.036	0.053	0.003	0.05
Culture	-0.017	0.031	0.086*	0.049	-0.069	0.047
Education	0.059*	0.032	0.009	0.037	-0.068**	0.032
Electricity	-0.148**	0.005	-0.095	0.138	0.243*	0.138
Finance	-0.044	0.032	0.005	0.042	0.039	0.038
Government	-0.039	0.037	-0.091*	0.047	0.131**	0.044
Health	0.009	0.023	0.044	0.03	-0.052*	0.028
Manufacturing	-0.043*	0.023	-0.085**	0.033	0.127**	0.032
Mining	-0.148**	0.005	-0.158	0.102	0.306**	0.102
Personal service	0.035	0.032	-0.091**	0.038	0.057	0.038
Property	-0.016	0.022	-0.050*	0.03	0.066**	0.029
Transport	-0.052*	0.029	-0.068	0.044	0.119**	0.043
Wholesale trade	-0.041	0.03	-0.042	0.043	0.083**	0.041
Hourly wage	0.001**	0	0.002**	0.001	-0.004**	0.001
Sample size: 3703	Log-likelihood: -2641.46			Pseudo R-sq: 0.280		

Note: All explanatory variables included in the models estimated in Section 3 are retained, but are not reported here. MME: Mean Marginal Effect. SE: Standard error. ** and * indicate significance at the 5 % and 10% levels, respectively.

While many of the variables for employment characteristics are not associated with significant effects on underemployment compared with other part-time employment, differences are nonetheless evident for the variables for occupation and industry, as well as

union membership, labour hire status, self-employment status and job tenure for females, and occupation tenure and sector for males. For females, union members, employees of labour hire firms and self-employed workers are relatively more likely to be underemployed. A negative association between job tenure and probability of underemployment is also evident for females, a result consistent with findings of Doiron (2003). No such effect is evident for males, although tenure in current occupation does have a quantitatively small, but statistically significant negative association with underemployment, matched by a corresponding positive association with full-time employment.[7] Public sector employment is also, for males, associated with a weakly significant reduced probability of underemployment compared with other part-time employment.

Marginal effects for occupation dummies show a broad pattern of underemployment being relatively more likely in lower-skill-level occupations, the notable exception being male labourers and related workers. Controlling for worker characteristics, two industries stand out for males as having high rates of underemployment: education; and health and community services. That the latter industry is associated with a relatively higher likelihood of underemployment is somewhat surprising given current concerns about health workforce shortages (e.g., see Productivity Commission, 2005), but this result may of course be driven by non-health workers in the industry. For females, education, manufacturing and personal service industries are associated with relatively higher probabilities of underemployment.

5. Conclusion

Growth in the incidence of underemployment in the Australian labour market in recent decades raises important questions about the factors determining underemployment. Using information in the HILDA 2001 Survey on both personal characteristics and job characteristics, the analysis undertaken in this study has provided new information on these factors. While some commonalities with the findings of Wooden (1993) and Doiron (2003) are evident, a number of new findings have been forthcoming – a result of the inclusion of the unemployed in the sample for the analysis of personal characteristics, the richer array of personal characteristics examined, and the distinction drawn in the analysis between fully

[7] Aside from using a different data source, there are methodological differences with Doiron that potentially contribute to differences in findings. Doiron defines underemployment in a manner that allows full-time workers to be underemployed, and estimates ordered probit models of underemployment, full employment and overemployment. Particularly important is that the validity of the ordered probit model critically depends on the underlying model being correct. For example, the model cannot allow specific characteristics to increase both underemployment and overemployment probabilities.

employed part-time workers and full-time workers. Particularly notable is the relatively strong predictive power of labour market history, as measured by an individual's last-year and lifetime employment and unemployment rates, which was not available to Wooden or Doiron.

Comparisons of the factors associated with underemployment with those associated with unemployment, other part-time employment and full-time employment reveal that underemployment and unemployment do indeed have a number of predictors in common. This is – at least to some extent – true for age, educational attainment, disability and labour market history. It is also the case that several factors that do not appear to affect likelihood of unemployment, such as housing situation and location of residence, are similarly irrelevant to likelihood of underemployment.

There are, however, several important differences in the predictors of underemployment and the predictors of unemployment, including effects attributable to family type, number of dependent children and number of jobs held in the preceding year. The number-of-jobs effect on underemployment is in the opposite direction to its effect on unemployment, reflecting the fact that the underemployed have a better recent history of success in gaining a foothold in the labour market, but also have difficulty finding 'suitable' jobs – that is, jobs with adequate hours. The impacts associated with family type and number of dependent children may in part reflect labour supply behaviour, rather than insufficient labour demand. For example, the positive effect on underemployment of the number of dependent children may reflect employment hours constraints that derive from caring responsibilities. Underemployment deriving from such effects is, of course, not true underemployment.

An alternative perspective on the predictors of underemployment is that, on several counts, the underemployed can be characterised as falling somewhere between the unemployed and other part-time workers. Age effects, educational attainment effects and several of the labour market history effects all fall into this category. For example, for males, a greater proportion of the preceding year unemployed acts to increase the probability of unemployment, has no effect on the probability of underemployment and acts to decrease the probability of other full-time employment.

The analysis undertaken on employed persons suggests that supply side factors unconnected to job characteristics are generally more important predictors of underemployment than are employment characteristics or demand-side factors. Many of the job characteristics associated

with underemployment are simply those associated with part-time employment. Nonetheless, significant effects are found for several job characteristics, including occupation and industry.

References

Australian Bureau of Statistics (ABS) (1995) *Family, Household and Income Unit Variables*, Canberra, Catalogue No. 1286.0.

ABS (1998) *Information Paper: 1996 Census of Population and Housing - Socio-Economic Indexes for Areas*, Canberra, Catalogue No. 2039.0.

ABS (2001) *Australian Standard Geographical Classification*, Canberra, Catalogue No. 1216.0.

ABS (2002a) 'Measures of Labour Underutilisation,' ABS Information Paper, Canberra, Catalogue No. 6296.0.

ABS (2002b) *Statistical Geography, Volume 2, Census Geographic Areas Australia 2001*, Canberra, Catalogue No. 2905.0.

Barrett, G. and D. Doiron (2001) 'Working Part-Time: By Choice or By Constraint,' *Canadian Journal of Economics* 34, 1042-65.

Bartus, T. (2005) 'Estimation of Marginal Effects using Margeff', *The Stata Journal*, 5(3), 309-29.

Bosworth, D. (1986) *Labour Utilisation in Australia: An Economic Analysis*, National Institute of Labour Studies, Working Paper Series, No. 88, September.

Bosworth, D. and T. Westaway (1987) 'Labour Hoarding, Discouraged Workers and Recorded Unemployment: An International Comparison', Australian Bulletin of Labour, 13, June, 143-61.

Brooks, C. and P.A. Volker (1985) 'Labour Market Success and Failure: An Analysis of the Factors Leading to the Workplace Destinations of the Australian Population', in P.A. Volker (ed.), *The Structure and Duration of Unemployment in Australia: Proceedings of a Conference, 4-5 August 1983*, BLMR Monograph Series No. 6, AGPS, Canberra.

Denniss, R. (2001) 'Measuring Employment in the 21st Century: New Measures of Underemployment and Overwork,' The Australia Institute discussion paper.

Doiron, D. (2003) 'Is Under-Employment due to Labour Hoarding? Evidence from the Australian Workplace Industrial Relations Survey,' *Economic Record*, 79(246), 306-23.

International Labour Organization (ILO) (1998) Report of the Sixteenth Conference of Labour Statisticians, Geneva.

ILO (2000) Current International Recommendations on Labour Statistics, ILO, Geneva.

Jacobs, J. (1993) 'Trends in Wages, Underemployment, and Mobility among Part-Time Workers,' Institute for Research on Poverty Discussion Paper No. 1021-93, University of Wisconsin-Madison.

Leppel, K. and S. Clain (1988) 'The Growth in Involuntary Part-Time Employment of Men and Women,' *Applied Economics*, 20(9), 1155-66.

Mitchell, W. and E. Carlson (2001) *Unemployment: The Tip of The Iceberg*, Centre for Applied Economic Research, University of NSW, Sydney.

Preston, A. (1997) 'Where are we now with Human Capital Theory?' *Economic Record*, 73(220), 51-78.

Productivity Commission (2005) *Australia's Health Workforce*, Research Report, Canberra.

Ruiz-Quintanilla, S. and R. Claes (1996) 'Determinants of Underemployment of Young Adults: A Multi-Country Study,' *Industrial and Labor Relations Review*, April.

Ross, R.T. (1985) 'Improved Labour Market Information: Beyond Unemployment Statistics', Australian Bulletin of Labour, 11(September), 236-45.

Wilkins, R. (2004) 'The Extent and Consequences of Underemployment in Australia', Melbourne Institute Working Paper No. 16/04.

Wooden, M. (1993) 'Underemployment in Australia', *Labour Economics and Productivity* 5, September, 95-110.

Appendix

Variable Descriptions

- Educational attainment (dummy variables):
  - *Degree*: highest educational qualification is a bachelor's degree or higher.
  - *Other post-school*.: Highest educational qualification is a post-school qualification other than 'degree'.
  - *High school*: Have no post-school qualifications and have completed the highest level of secondary school.
  - *Has not completed H-S*: Have no post-school qualifications and have not completed the highest level of secondary school (the omitted dummy in regression models).
- *Disabled*: Respondent has a long-term health condition or disability that limits the type or amount of work he or she can do (dummy variable).
- Family type: Families are defined in the same way as the ABS defines income units (see, for example, ABS, 1995). Four family types are distinguished (dummy variables):
  - *Single*: Single person (the omitted dummy).
  - *Couple*: Couple living together (whether legally married or not) with no dependent children.
  - *Sole parent*: Lone parent with dependent children.
  - *Couple parents*: Couple living together (whether legally married or not) with dependent children.
- Dependent children (dummy variables):
  - *Youngest aged under 5*: Youngest resident dependent child is under 5 years of age (omitted dummy)
  - *Youngest aged 5-15*: Youngest resident dependent child is aged 5 to 15 years
  - *Youngest aged 16-24:* Youngest resident dependent child is aged 16 to 24 years.
- Number of dependent children: Count of number of resident dependent children.
- Place of birth and Indigenous status (dummy variables):
  - *Indigenous*: Aboriginal or Torres Strait Islander.
  - *Other Australian-born*: Born in Australia and not Indigenous.
  - *ESB immigrant* (English-speaking background immigrant): Person born in New Zealand, the UK, Ireland, Northern America or South Africa.
  - *NESB immigrant* (Non-English-speaking background immigrant): Person born outside Australia who is not an ESB immigrant.
- *Years since mig – ESB*: Years since migration for ESB immigrants, equal to 2001 minus year of arrival in Australia.
- *Years since mig – NESB*: Years since migration for NESB immigrants.
- *Poor English*: Respondent speaks English poorly or doesn't speak English at all (dummy variable).
- Family background (dummy variables):
  - *Father emp when 14*: Father was employed when the respondent was aged 14 years.
  - *Mother emp when 14*: Mother was employed when the respondent was aged 14 years.
  - *Both parents present when 14*: The respondent lived with both parents at 14 years of age.
- Housing status (dummy variables):
  - *Renting:* Pay rent or board for current accommodation.

  - *Paying mortgage*: Paying off mortgage on current residence.
  - *No rent or mortgage*: No accommodation expenses (omitted dummy).
- Region of residence: Dummy variables, derived from the Accessibility/Remoteness Index of Australia scores from the 1996 Census (see ABS, 2001).
- *Local unemployment rate*: Unemployment rate in the respondent's ABS statistical region in 2001, derived from the 2001 Census. There are 63 statistical regions in Australia. See ABS (2002b) for details.
- *SEIFA decile*: Decile of the 1996 ABS socio-economic indicators for areas (SEIFA) index for the Statistical Local Area in which the respondent resides. Higher deciles correspond to lower disadvantage. See ABS (1998) for details on the construction of the index.
- *Not emp – life* (proportion of potential working life not employed): Proportion of time since 15 years of age have not been employed. Derived from data items in the HILDA survey dataset for 'age', 'years in paid work', 'years unemployed' and 'years not in the labour force'.
- *Unemp – life* (proportion of potential working life not employed): Proportion of time since 15 years of age have been unemployed. Derived from data items in the HILDA survey dataset for 'age' and 'years unemployed'.
- *Emp – year* (proportion of last year employed): Proportion of time employed in the 2000-2001 financial year.
- *Not emp – year* (proportion of last year not employed): Proportion of time not employed in the 2000-2001 financial year.
- *Unemp – year* (proportion of last year unemployed): Proportion of time unemployed in the 2000-2001 financial year.
- *No. jobs – year*: Count of the number of full-time and part-time jobs held in the 2000-2001 financial year.
- *Union member*: Member of a trade union (dummy variable).
- *Regular schedule (M-F)*: Usually works regular daytime hours, Monday to Friday – that is, hours worked do not usually vary and does not work nights or weekends (dummy variable).
- *Casual*: Not entitled to paid sick leave or paid annual (vacation) leave and is not self-employed.
- *Labour hire:* Employed by a labour hire firm.
- *Fixed term contract*: Employed on a fixed-tern contract.
- *Self employed*: Employer, own-account worker, owner-manager or family helper (dummy variable).
- *Tenure – employer (yrs)*: Duration (in years) of employment with current employer.
- *Tenure – occupation (yrs*): Duration (in years) in current occupation.
- Size of firm/employer (dummy variables):
  - *Small*: Fewer than 20 employees
  - *Medium*: 20-99 employees
  - *Large*: 100 or more employees (omitted dummy)
- Public sector: Employed in the public sector (dummy variable).
- Occupation of employment (dummy variables): *Manager* - Managers and administrators; *Professional* – Professionals (the omitted dummy); *Associate professional* - Associate professionals; *Advanced clerical* - Advanced clerical and service workers; *Intermediate clerical* - Intermediate clerical and service workers; *Elementary clerical* - Elementary clerks, sales workers and service workers; *Trade* - Tradespersons; *Intermediate prod.*- Intermediate production and transport workers; and *Labourer* - Labourers and related workers.
- Industry of employment (dummy variables): *Accommodation* - Accommodation, cafes and restaurants; C*ommunication* - Communication services; C*onstruction* - Construction; C*ulture* - Culture and recreation; *Education* - Education; *Electricity* - Electricity, gas and water; *Finance* - Finance and insurance; Government - Government administration and defence; *Health* - Health and community services; *Manufacturing* - Manufacturing; *Mining* - Mining; *Personal service* - Personal and other services; *Property* - Property and business services; *Retail trade* - Retail trade (the omitted dummy); *Transport* - Transport and storage; *Wholesale trade* - Wholesale trade; and *Agriculture* - Agriculture, forestry and fishing.
- Hourly wage: Usual weekly wage and salary income divided by usual weekly hours of work.

Table A1: Sample characteristics – Means of variables

Variable name	Males	Females	Variable name	Males	Females
Unemployed	0.073	0.061	Local unemployment rate	0.075	0.075
Underemployed	0.066	0.138	*Employment history*		
Involuntarily part-time employed	0.036	0.058	Not emp - life	0.072	0.177
Other underemployed	0.030	0.081	Unemp - life	0.030	0.020
Fully employed	0.861	0.801	Not emp - year	0.073	0.094
Fully employed part-time	0.080	0.323	Unemp - year	0.052	0.038
Full-time employed	0.781	0.478	Number of jobs - year	1.18	1.20
Personal characteristics			***Employment characteristics (employed persons only)***		
Age 15-24	0.169	0.184	Union member	0.281	0.263
Age 25-34	0.235	0.234	Regular schedule (M-F)	0.702	0.683
Age 35-44	0.275	0.273	Casual	0.174	0.284
Age 45-54	0.213	0.227	Labour hire	0.030	0.029
Age 55-64	0.107	0.081	Fixed term contract	0.070	0.079
Educational attainment			Self employed	0.231	0.141
Degree	0.206	0.266	Tenure – employer (years)	7.6	5.8
Other post-school	0.421	0.324	Tenure – occupation (years)	10.5	8.3
High school	0.120	0.130	*Size of firm/employer*		
Has not completed H-S	0.253	0.281	Small	0.394	0.346
Disability	0.089	0.074	Medium	0.146	0.141
Family type			Large	0.460	0.512
Single	0.286	0.241	Public sector	0.163	0.253
Couple - no dep children	0.265	0.291	*Occupation*		
Sole parent	0.021	0.077	Managerial	0.122	0.056
Couple - dep children	0.428	0.391	Professional	0.187	0.248
Dependent children			Associate professional	0.115	0.121
Youngest 0-4 years	0.169	0.126	Advanced clerical	0.007	0.067
Youngest 5-15 years	0.224	0.267	Intermediate clerical	0.089	0.242
Youngest 16-24 years	0.056	0.075	Elementary clerical	0.059	0.138
Number of dependent children	0.91	0.90	Trade	0.191	0.033
Place of birth and Indigenous status			Intermediate production	0.126	0.025
Indigenous	0.014	0.019	Labourer	0.101	0.071
Other native-born	0.744	0.758	*Industry*		
ESB immigrant	0.113	0.099	Agriculture	0.069	0.035
NESB immigrant	0.130	0.124	Accommodation	0.041	0.063
Years since mig - ESB	23.4	23.3	Communication	0.026	0.016
Years since mig - NESB	19.6	19.3	Construction	0.115	0.021
Poor English	0.010	0.009	Culture	0.030	0.029
Family background			Education	0.051	0.136
Father emp when 14	0.822	0.823	Electricity	0.014	0.002
Mother emp when 14	0.440	0.479	Finance	0.030	0.043
Both parents present when 14	0.827	0.818	Government	0.046	0.036
Housing status			Health	0.038	0.195
Renting	0.269	0.261	Manufacturing	0.145	0.063
Paying mortgage	0.403	0.413	Mining	0.022	0.004
No rent or mortgage	0.328	0.326	Personal service	0.035	0.039
Region of residence			Property	0.108	0.111
Major city	0.596	0.602	Retail trade	0.118	0.152
Inner regional	0.276	0.270	Transport	0.062	0.023
Outer regional or remote	0.128	0.128	Wholesale trade	0.047	0.028
SEIFA decile	5.79	5.88	Hourly wage ($)	17.89	17.29
Sample size	**4775**	**4186**			