

Underemployment in Australia: Evidence from the HILDA Survey

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Executive summary

- Underemployment is generally conceived as excess labour supply associated with employed persons – that is, as a situation where employed persons would like to work more hours at prevailing wage rates.
- Using information collected by the 2001 Household Income and Labour Dynamics in Australia (HILDA) survey, this study seeks to investigate:
 1. The *extent* of underemployment. How many people are underemployed, and what is the extent of underemployment of the underemployed?
 2. The *effect* of underemployment on outcomes. How do outcomes such as incomes, health, life satisfaction, quality of working life and income support use for the underemployed compare with outcomes of the unemployed and the employed?
 3. The *factors* associated with underemployment. What characteristics are associated with being underemployed? Which groups in the community are most severely affected?

The first two lines of inquiry involve ascertaining the significance of the problem of underemployment by examining, first, its pervasiveness and extent, and second, the outcomes associated with underemployment. The third line of inquiry addresses who is affected by underemployment by exploring the relationship between characteristics and underemployment.

- For the purposes of this study, underemployment is 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.
This is based on the International Labor Organization (ILO) (1998) definition, and the information available in the HILDA survey data. However, an alternative, more general, definition is also used in this study, which allows persons who usually work 35 or more hours per week (full-time workers) to be underemployed.
- There are two main alternative measures of underemployment: headcount measures (number of persons underemployed) and volume measures (number of hours of underemployment), both of which are used in this study. Headcount measures provide information about the *pervasiveness* of underemployment (how many people are affected), while volume measures provide information about the extent of underemployment (how many hours of supplied labour are not utilised because of underemployment).
- Over one in six employed persons is affected by underemployment, with the majority of these employed part-time. Underemployment is more frequently associated with part-time employment for females, while for males is in fact more frequently associated with full-time employment. However, the volume measure of underemployment indicates that, for both males and females, the number of supplied hours by employed persons that is not utilised is higher for part-time workers. Specifically, for males, 2.5 per cent of supplied hours are unutilised hours of part-time workers, compared with 2 per cent of supplied hours being unutilised hours of full-time workers. For females, 5.7 per cent of supplied hours are unutilised hours of part-time workers, and 0.9 per cent of supplied hours are unutilised hours supplied by full-time workers. In terms of the extent of underemployment among the underemployed, part-time workers who are underemployed on average desire 13 more hours of work per week, while underemployed full-time workers on average desire just over 9 more hours.
- Descriptive statistics indicate that underemployment is much higher among young people, sole parents and single people, and those whose highest educational attainment is

‘completed high school’. Aside from the generally higher levels of part-time worker underemployment, and lower levels of full-time worker underemployment, for females compared with males, patterns across population groups are broadly similar for males and females.

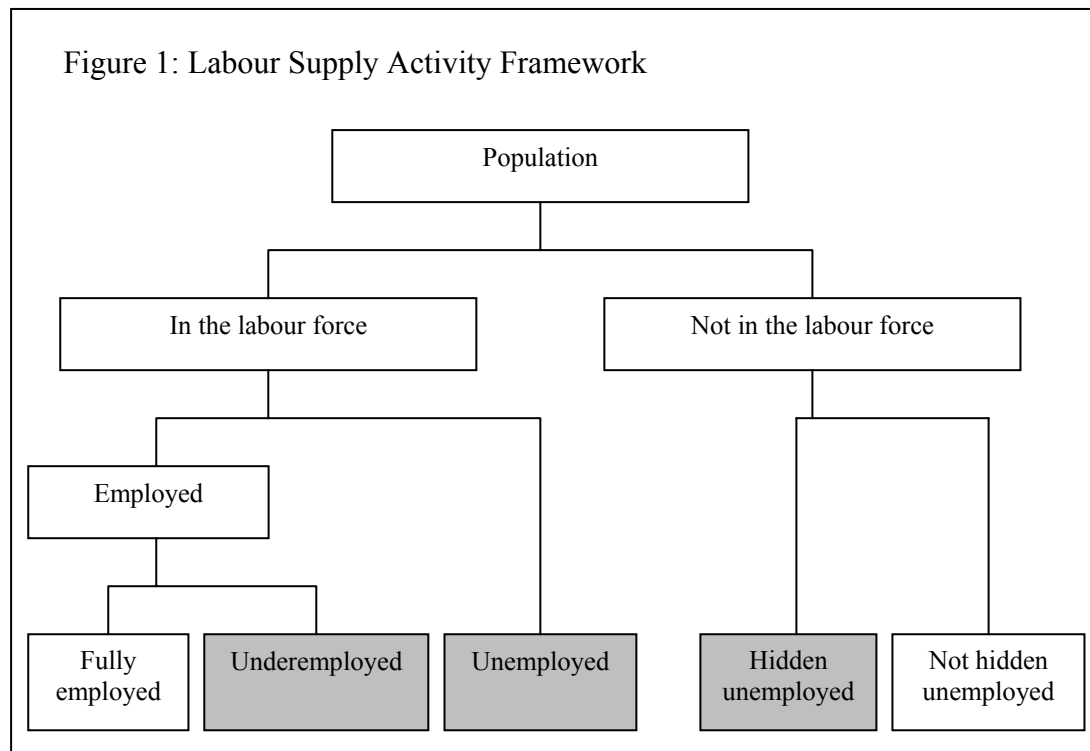
- Descriptive statistics comparing the outcomes experienced by underemployed persons with those of unemployed persons and fully employed persons suggest the underemployed are somewhere in-between the other two groups on many counts. Sample means of the variables for life satisfaction, income support receipt, income, experience of financial difficulty and employment histories imply that outcomes are, on average, worst for the unemployed and best for the fully employed. For most of these outcomes, the underemployed are very close to midway between the unemployed and fully employed. Mean job satisfaction is also significantly lower among the underemployed compared with the fully employed. Interestingly, however, mean wages are not significantly lower for the underemployed.
- Models are estimated, on persons in the labour force, of the association between underemployment and measures of income support receipt, income unit income, personal income and life satisfaction. Part-time underemployment for females is associated with significant negative effects for all four outcomes, while full-time underemployment is not associated with any significant effects for females. For males, significant negative effects of part-time underemployment are evident for income support receipt, income unit income and life satisfaction, while significant negative effects of full-time worker underemployment are found for life satisfaction. All negative effects attributable to underemployment are smaller than those attributable to unemployment. Outcome models estimated on employed persons also show that part-time underemployment is associated with lower job satisfaction for both males and females.
- Probit models of underemployment are estimated on employed persons to identify the factors associated with underemployment.
 - For males, it is found that, given employment, those who are younger, less educated, single, either indigenous or a non-English speaking (NESB) immigrant, and who live in high unemployment regions, are more likely to be underemployed. Furthermore, while there is no significant effect associated with the number of dependent children aged less than 15 years, the number of dependent children aged 15-24 years has a positive effect on the probability of male underemployment. Variables for employment history are also found to exert significant effects. A long-term history of unemployment (which is likely to reflect comparatively low levels of unobserved human capital) is associated with a higher probability of underemployment. A long-term history of non-participation in the labour force, by contrast, does not impact on the likelihood of underemployment. In the short-term (preceding year), however, non-employment – whether due to non-participation in the labour force or unemployment – makes underemployment more likely. This possibly reflects the difficulties workers face following non-employment in (re-)establishing themselves in the labour market and finding a good job. A further finding with respect to employment history is that a higher number of jobs in the previous financial year is associated with a higher underemployment probability. This is consistent with the underemployed having difficulty finding a good employment match. It is also found for males that increased employment tenure is associated with a decreased probability of underemployment, while lower-skill occupations are associated with a higher probability of underemployment.

- For females, differences from males in the factors associated with underemployment arise with respect to variables for the number of dependent children, indigenous status, English proficiency, length of residency in Australia for NESB immigrants, the local unemployment rate and employment history. The probability of underemployment is increasing in the number of dependent children aged less than 15, in contrast to males, for whom it is the number aged 15-24 that matters. This effect is likely to reflect parenting responsibilities for younger children, which are perhaps more likely to be borne by females than males. There is a negative effect associated with a lack of proficiency in English, the reasons for which are not clear. As with males, NESB immigrants have a higher probability of underemployment, but, in contrast to males, increased length of time resident in Australia diminishes this effect for females. Effects of unemployment history and non-employment history of females are broadly similar to those of males, the important difference being that recent unemployment history and long-term non-employment history also have significant effects on underemployment status. Two variables with significant effects for males do not have significant effects for females: indigenous status and the local unemployment rate. The absence of an effect for the latter implies labour demand conditions are not a factor in underemployment among employed females, which represents an important difference to males.
- Multinomial logit models estimated on all persons in the labour force facilitate comparisons of the factors associated with underemployment with those associated with unemployment. Estimates imply underemployment and unemployment have many predictors in common. Important differences do arise, however, with respect to income unit type, number of dependent children and number of jobs held in the preceding financial year. Income unit type and number of dependent children do not affect the probability of unemployment, but do affect the probability of underemployment. These effects possibly reflect labour supply preferences (perhaps associated with family commitments), rather than labour demand constraints. The number of jobs held has a negative effect on the probability of unemployment, but a positive effect on the probability of underemployment – thus, more jobs in the recent past is helpful for avoiding unemployment, but appears to reflect difficulty finding ‘good’ employment.
- Models are also estimated of the extent of underemployment, given an individual is underemployed. However, most coefficient estimates are not statistically significant..

1. Introduction and Motivation

It is widely acknowledged that the unemployment rate understates the extent to which labour is ‘underutilised’ (e.g. Ross (1985), Bosworth and Westaway (1987), Bregger and Haugen (1995), Mitchell and Carlson (2001), Denniss (2003)). An important component of underutilisation that is not captured by unemployment statistics is underemployment, which occurs when employed persons would like to work more hours at the prevailing wage rates than they actually work.¹ At a fundamental level, therefore, the study of underemployment is important for its contribution to understanding the true extent of excess supply (or ‘underutilisation’) of labour.

Figure 1 presents a conceptual framework for labour market activity which shows the three main components of (time-related) labour underutilisation: underemployment, unemployment and hidden unemployment. All three groups represent individuals who would like to work more hours at prevailing wage rates. The underemployed are distinguished from the unemployed by the fact that at least some employment is held. Both the underemployed and unemployed are distinguished from the hidden unemployed by the fact that they are in the labour force – the hidden unemployed are not in the labour force because of perceptions that gaining employment is unlikely.



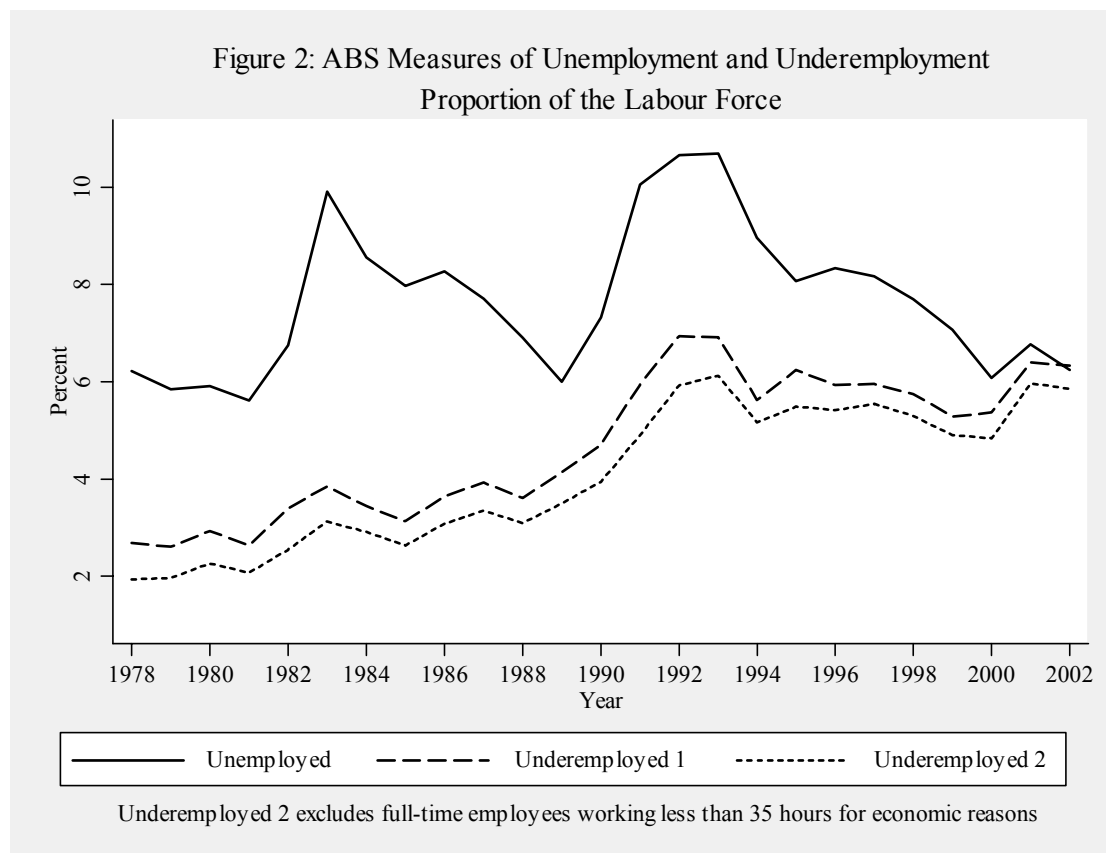
The Australian Bureau of Statistics (ABS) has produced information on the extent of underemployment in each year since 1978 as part of its labour force survey (Cat. No. 6203.0). The ABS measure includes:

- persons who normally work less than 35 hours per week who would prefer to work more hours and are available to work those hours (part-time underemployed); and

¹ In this paper the narrow ‘time-related’ definition of underemployment (ILO, 1998) is adopted, excluding, for example, inadequate use of worker skills. See Section 4 for further discussion of this issue.

- persons who normally work 35 or more hours per week but did not work 35 or more hours in the reference week for ‘economic’ reasons, which comprise ‘stood down’, ‘short time’ and ‘insufficient work’ (full-time underemployed).²

Figure 2 presents ABS estimates of the proportion of the labour force unemployed and underemployed in each year from 1978 to 2002 (August each year until 1993, September each year thereafter). It indicates that the proportion underemployed has converged over the period to the proportion unemployed – that is, the number underemployed is now as large as the number unemployed. Thus, underemployment appears to be a growing problem relative to unemployment. Note, however, that the extent of excess supply represented by underemployment is still likely to be smaller than that represented by unemployment, since the shortfall of actual hours of work from desired hours is likely to be greater on average for the unemployed.³



Source: ABS Cat No. 6203.0

² Note that this measure restricts underemployment to those working less than 35 hours per week. Statistics produced by the ABS over the period 1966 to 1977 on ‘reasons for working less than 35 hours per week’ also allow construction of an underemployment measure over this period. This measure is, however, different to the ABS measure that has been applied since 1978. The measure available prior to 1978 is number/proportion of persons who ‘normally work part-time, but prefer to work 35 or more hours’. This therefore excludes part-time workers who prefer more hours, but not as many as 35 hours, and full-time workers who are temporarily working less than 35 hours for ‘economic’ reasons. (The information on the reasons for working less than 35 hours for full-time employees does not permit identification of ‘economic’ reasons.) An irregular publication ‘Underemployed Workers, Australia’ (Cat. No. 6265.0), providing information on the characteristics of underemployed workers, was first published for May 1985 data. The ABS released subsequent issues for May 1988 and May 1991. The publication became a regular (annual) publication in 1996, and has been produced for September of each year from 1996 to 2002.

³ The HILDA 2001 survey shows that it is in fact the case that the shortfall of hours worked is on average greater for the unemployed. See Section 5.

Although the Labour Force Survey suggests underemployment is widespread, an important question is “how concerned should we be about underemployment vis-à-vis unemployment?” The underemployed are clearly very different from the unemployed in that they already have a foothold in the labour market and are earning wage and salary income. But, in other respects, are the underemployed more like the employed or more like the unemployed? The policy significance of underemployment is greater the more it is associated with the low incomes, high rates of welfare receipt and other adverse outcomes that are in evidence for the unemployed. If, on the other hand, the underemployed tend to reside in high income households and experience outcomes more like those experienced by the employed than by the unemployed, policy concern is reduced compared with concern for the unemployed.

Given that underemployment is of at least some policy concern, a further line of inquiry takes on interest, which is the factors associated with underemployment – that is, the predictors of underemployment. Such information is very valuable because policy can potentially address these factors. If underemployment is associated with specific personal characteristics (for example, for age, educational attainment, ethnicity and health), programs can be directed at persons with these characteristics. This line of inquiry is particularly of interest for whether the factors associated with underemployment differ significantly from those for unemployment, in which case policies to address unemployment may not assist all underemployed persons.

In light of these issues, using information collected by the 2001 Household Income and Labour Dynamics in Australia (HILDA) survey, this study seeks to assess the extent, significance and factors associated with underemployment in Australia. Specifically, the following questions are investigated:

1. What is the *extent* of underemployment? How many people are underemployed, and what is the extent of underemployment of the underemployed?
2. What is the *effect* of underemployment on outcomes? How do outcomes such as incomes, health, life satisfaction, quality of working life and income support use for the underemployed compare with outcomes of the unemployed and the employed?
3. What are the *factors* associated with underemployment? What characteristics are associated with being underemployed? Which groups in the community are most severely affected?

The first two lines of inquiry involve ascertaining the significance of the problem of underemployment by examining, first, its pervasiveness and extent, and second, the outcomes associated with underemployment. The third question addresses who is affected by underemployment by exploring the relationship between characteristics and underemployment. The population examined is restricted to persons aged 15-64 years, interpreted as the workforce-age population. Furthermore, all of the analysis in this study is undertaken for males and females separately, on the basis that the effects of underemployment and the factors associated with underemployment are likely to be quite different for males and females.

2. Background Discussion

Although underemployment represents excess supply in the labour market which is not identified by standard labour market statistics, the problem of underemployment has long been recognised. The concept was ‘accepted’ by the Sixth International Conference of Labour Statisticians (ICLS) in 1948, and a resolution formally defining underemployment was adopted at the Eleventh ICLS in 1966. Correspondingly, since 1966 the ABS has produced statistics based on the notion that

underemployment exists, beginning with identifying part-time workers who would prefer to work full-time in the August 1966 Labour Force Survey.

Research on underemployment Australia in fact has its origins with the ABS (1984), who attempt to document trends in the proportion of the labour force underemployed between 1966 and 1983 based on the information collected in the ABS Labour Force Survey. The ABS estimates show a trend increase between 1966 and 1983 in the proportion of the labour force that is underemployed. Since then, others to have produced estimates of the extent of underemployment in Australia include Ross (1985), Bosworth (1986), Bosworth and Westaway (1987), Wooden (1993, 1996), Denniss (2001) and Mitchell and Carlson (2001). Most of these studies have been primarily concerned with obtaining a more accurate picture of the extent of labour underutilisation than is provided by official unemployment rate statistics. All use ABS published data to measure underemployment, and those that examine trends over time therefore concur with the evidence presented in Figure 1 of a trend increase in underemployment.

In addition to measuring the extent of underemployment, Wooden (1993) also describes the key characteristics of the underemployed using unit record data from the May 1991 Labour Force Survey. He finds the underemployed were, compared with the fully employed, more likely to be female, young (less than 25 years of age), single and a non-English speaking background (NESB) immigrant. The probability of being underemployed was also higher for persons working in less skilled occupations (sales and personal service workers, plant and machine operators, labourers and related workers) and for those working in the recreation and personal services and construction industries. Wooden (1996) builds on Wooden (1993) by looking at *changes* in the characteristics of underemployed workers between 1985 and 1995 using aggregate ABS data (published in 1985 and 1995 as 'Underemployed Workers, Australia'). He finds increases in the proportion who are over 45 years of age, NESB immigrants and males. He also estimates the implications of the existence of underemployment and hidden unemployment for the relationship between output growth and the unemployment rate.

International research has, like the Australian research, attempted to document trends in the extent of underemployment (e.g. Bregger and Haugen (1995), Sorrentino (1995)) and examine the factors associated with, or determinants of, underemployment (e.g. Leppel and Clain (1988), Ruiz-Quintanilla and Laes (1996)). Research has also attempted to account for underemployment in models of labour supply in order to accurately infer labour supply elasticities (the responsiveness of labour supply to changes in wage rates) (e.g. Ham (1982), Kahn and Lang (1991), Dickens and Lundberg (1993), Stewart and Swaffield (1997)).

The contribution of this study to existing research derives from using an alternative data source to the ABS Labour Force Survey, the HILDA 2001 survey. First, in addition to examining the extent of underemployment as measured by the ABS, this study also considers a broader notion of underemployment which includes persons working full-time hours. Second, the HILDA survey collects information on a wide range of characteristics and outcomes of respondents, allowing more comprehensive study of both the consequences of underemployment for the underemployed and the factors associated with underemployment than was possible for Wooden (1993, 1996). This study is therefore able to make a significant contribution to our understanding of the significance and nature of the problem of underemployment in Australia.

3. The HILDA Survey Data

The Household, Income and Labour Dynamics in Australia (HILDA) Survey, described in Watson and Wooden (2002), is a nationally representative household panel survey. The first wave, data from which is used in this study, was conducted in 2001, seeking information about all members of sampled households, and specifically seeking personal interviews with all

household members who turned 15 years of age prior to 1st July 2001. Completed interviews with all eligible members were obtained for 6,872 households, out of a total of 11,693 households selected for inclusion in the sample. Interviews with at least one eligible household member were obtained for a further 810 households. The result is (at least partial) data on 13,969 persons aged 15 years or more, 11,920 of whom are aged less than 65 years.⁴

The first wave of the HILDA survey collected information on a wide range of personal and household characteristics, including income; sources of income; labour force and employment status; hours of employment; industry and occupation of employment; trade union membership status; tenure with current employer; employer characteristics; labour force history; educational attainment; family circumstances; health; country of birth; and, if born outside Australia, year of arrival in Australia. It also obtained from respondents their views or opinions on a wide range of issues, including satisfaction with life circumstances, satisfaction with employment circumstances and attitudes to work and gender roles, the respondent's job and workplace, and parenting. Importantly for the purposes of this study, the data collected include, in addition to information on actual hours of paid work, information on preferred hours of work, making possible the construction of measures of underemployment.⁵

4. The Definition of Underemployment

Given the parallels between underemployment and unemployment – both corresponding to forms of excess labour supply – a logical starting point for a definition of underemployment is one that is consistent with the notion of unemployment:

Underemployment Definition 1: Underemployment occurs when employed persons would like to work more hours at the prevailing wage rates than they actually work, and are actively seeking and available to work those additional hours.

This definition approximately corresponds to what the International Labour Organization (ILO) calls 'time-related' underemployment, the measure of underemployment adopted at the Sixteenth ICLS (ILO, 1998).⁶ It is not, however, entirely consistent with the ILO (1998) definition. According to this definition, persons in time-related underemployment comprise all persons in

⁴ There are 5948 enumerated persons for whom no person records are available (non-respondents). Of these, 4317 are aged 0-14 years and are therefore out of scope; the remainder are actual non-respondents. Information on the existence of these individuals was used, however, in generating information about household, family and income unit characteristics.

⁵ The unit record file contains 'responding person population weights' which are set according to external population benchmarks (and discussed in detail in Watson and Fry (2002)). These are used in all of the descriptive analysis to facilitate population inferences, but not in the regression analysis.

⁶ The ILO distinguishes underemployment associated with insufficient hours of work (time-related underemployment) from other forms of 'inadequacy of employment situations'. Inadequate employment situations comprise '...situations in the workplace which reduce the capacities and well-being of workers compared to an alternative employment situation' (ILO (1998)). This is an exceptionally vague notion, although the ILO describes some specific situations that might be considered inadequate employment situations, including: inadequate use of occupational skills; excessive hours of work; inadequate tools, equipment or training for the assigned tasks; travel to work difficulties; inconvenient work schedules; and recurring work stoppages because of delivery failures of raw material or energy. The ILO currently has the position that '...the statistical definitions and methods necessary to describe such situations still have to be developed further' (ILO (1998)). Prior to the ICLS 1998, the ILO definition of underemployment was that adopted by the ICLS 1966. This definition distinguished 'visible' underemployment from 'invisible' underemployment. 'Visible' underemployment approximately corresponds to 'time-related' underemployment. 'Invisible' underemployment comprises workers employed in jobs not making full use of the skills held by the workers (because the job itself is low skill and/or the worker is idle part of the time), and is therefore a subset of 'inadequate employment situations'. See ILO (1990) for further details on visible and invisible underemployment.

employment who satisfy the following three criteria during the reference period used to define employment:

1. Willing to work additional hours, i.e. wanted another job (or jobs) in addition to their current job (or jobs) to increase their total hours of work; to replace any of their current jobs with another job (or jobs) with increased hours of work; to increase the hours of work in any of their current jobs; or a combination of the above;
2. Available to work additional hours, i.e. are ready, within a specified subsequent period, to work additional hours;
3. Worked less than a threshold relating to working time, i.e. persons whose hours actually worked in all jobs in the reference period, were below a threshold, to be chosen according to 'national circumstances'.

This definition does not require *active search* for additional hours of work, possibly because of the view that a worker can be underemployed simply if more hours with the current employer are sought. It also does not require that workers desire more hours *at prevailing wage rates*, although this condition might be considered implicit. Furthermore, the third requirement, that a worker be working less than a chosen threshold, is not implied by *Definition 1* given above. The logic for this requirement appears to be that underemployment is only likely to be associated with the adverse consequences associated with unemployment when hours worked are less than some norm. Defining this norm is a potentially difficult task, but a common approach is to adopt full-time hours (35 or more hours per week) as the threshold (e.g. this is the ABS approach), implying full-time workers cannot be underemployed. For this reason, underemployment is often referred to as 'involuntary part-time employment' by researchers in the field (e.g. Bednarzik (1975), Leppel and Clain (1988) and Jacobs (1993)).

The HILDA survey asks all employed persons how many hours they usually work per week in all jobs (usual actual hours), and, furthermore, how many hours per week they would like to work, taking into account the effect this would have on their income (desired hours). Attempting to remain consistent with the ILO definition where possible, this information makes possible the following definition of underemployment:

Underemployment Definition 2: Underemployment occurs when employed persons who usually work less than 35 hours per week would like to work more hours than they currently usually work.

This is broadly consistent with established standards (and also ABS practice), but has several weaknesses:

- It will potentially include people who express a preference for more hours of work, but who are not *available* to work more hours.⁷ For example, workers who work fewer hours than desired because of ill health or family commitments are not truly underemployed. If an individual would like to work more hours but chooses not to supply them because of reasons such as these, then they are not constrained by inadequate labour demand, which is the principle underpinning the concept of underemployment. The survey does not ask workers if they are available to work additional desired hours of work. Therefore, we are unable to impose this requirement (of both *Definition 1* and the ILO's definition) on a measure of underemployment based on the HILDA data. This is potentially an important weakness.
- It excludes full-time workers who are temporarily working less than 35 hours for economic reasons. This is because the HILDA survey collects information on *usual* hours of work, not

⁷ In common with the ILO definition, and at odds with the concept of unemployment, the adopted definition also does not require *active search* for the additional hours.

hours in the survey week (or, to be consistent with the ILO definition, during the reference period used to define employment). However, as Figure 1 shows, this is a relatively small component of underemployment.

- It potentially includes worker who would like to work more hours, but only at higher wage rates than on offer. For underemployment to represent excess labour supply requires workers to prefer more hours *at prevailing wage rates* (which is not a requirement of the above definition). However, ‘prevailing wage rates’ is not a well-defined concept, and failure to impose this requirement is consistent with the usual practice internationally.
- It excludes full-time workers who would like more hours. This is based on the ILO requirement that, for a worker to be regarded as underemployed, actual hours need to be less than the ‘normal’ duration. In this paper, ‘normal’ has been assumed to be 35 hours per week. There is, however, no reason in principle to exclude persons working 35 or more hours per week, and the ILO definition therefore does not seem appropriate on this count. If a worker wants more hours, this constitutes a situation of excess supply of labour, and it arguably should not matter what is the ‘normal’ duration of work. Exclusion appears to be based on a judgement about the relative social welfare costs of underemployed full-time workers vis-à-vis underemployed part-time workers. To some extent, this is assuming the outcome which this study seeks to investigate – the consequences of underemployment. For this reason, underemployment of full-time workers is also investigated in this study.⁸

Two other issues with respect to the definition of underemployment warrant mention. First is that measures of underemployment are likely to be sensitive to the time frame over which underemployment is measured. For example, results will likely differ if the time frame is one week versus one year. The nature of the HILDA survey data creates a somewhat indistinct time frame, since respondents are asked about *usual* weekly hours, and whether they would like to work more hours than this. While usual weekly hours may be a well-defined concept for many workers, it may be ambiguous for respondents with variable hours, and the time frame over which such respondents construct their notions of ‘usual’ is likely to vary across respondents. A second issue is that Wave 1 of the HILDA survey was conducted in the third and fourth quarters of 2001. We should therefore note the potential for seasonal factors to impact on underemployment measures, and on the outcomes and factors associated with underemployment.

4.1. Measures of underemployment

There are two main approaches to measuring underemployment:

1. Headcount measures (number of persons underemployed)
2. Volume measures (number of hours of underemployment)

Headcount measures provide information about the *pervasiveness* of underemployment (how many people are affected), while volume measures provide information about the *extent* of underemployment (how many hours of supplied labour are not utilised because of underemployment). Estimation of volume measures are possible using the HILDA survey data, because the unit record file contains data on both actual and preferred working hours of all those in employment (both full-time and part-time employed). Underemployment measures are most informative if expressed as relative measures, which is the approach adopted in this report. For example, the volume measure can be represented as:

⁸ Also note that the ILO (1998) does suggest that information should be collected on full-time workers who express a preference and availability for more hours, implying this is in fact of interest to studies of labour underutilisation.

$$V = \frac{\sum_{i=1}^n U_i}{\sum_{i=1}^n S_i} \quad (4.1)$$

where U_i is the number of hours of underutilisation of individual i and S_i is the preferred ('supplied') number of hours of work of individual i . The definitions of both U and S can be varied to produce different volume measures, the main constraint being that U should be a subset of S . For example, U could be 'additional hours wanted by part-time workers', and S 'total desired hours of part-time workers' or 'total desired hours of all workers'; or U might be 'additional hours wanted by part-time workers up to a maximum of 35 per week, inclusive of hours already being worked', and S might then be 'hours desired by employed persons, up to a maximum of 35 per week'.

Statistics presented comprise the mean proportion of persons underemployed, the proportion of supplied hours that are not utilised because of underemployment, and the mean, median, standard deviation and inter-quartile range of the number of hours of underemployment (among the underemployed). Distributional features other than the mean are of some interest for volume measures of underemployment. In particular, the degree of dispersion of the extent of underemployment among the underemployed is considered via the standard deviation and inter-quartile range.

For volume measures, an issue arises regarding the appropriate treatment of employed persons who desire fewer hours than usually worked (the overemployed). The approach taken in this study is to set underemployment equal to zero for these persons. From one perspective, ignoring overemployment in this manner involves discarding information on hours of work relative to stated preferences on working hours. Indeed, this argument can be extended to persons not employed who have a stated preference for positive hours of work (who are not underemployed, because they are not employed).

This issue is particularly important with regard to estimation of models of the determinants of underemployment (undertaken in Section 7). It is arguable that estimation of a general (unified) model of the gap between preferred and actual hours of work, estimated over the working-age population, including those not in the labour force, the unemployed, the underemployed, the fully employed and the overemployed, could potentially explain the full range of outcomes with respect to the difference between preferred and actual working hours (as opposed to simply explaining underemployment). Such an approach would also potentially overcome econometric problems associated with truncation of the distribution of the difference between preferred and actual hours of work that can arise with a focus on underemployment (as defined). However, this would constitute a significant broadening (and indeed change) of the scope of the study, one that is not obviously desirable. While the overemployed are a group of significant interest, they are likely to be quite different from the underemployed.⁹ With respect to the unemployed, there already exists a large amount of research, both internationally and in Australia, into the extent, causes and consequences of unemployment.

There are also practical issues with such a unified approach. First, it may not be possible to find a single model that can satisfactorily explain unemployment, underemployment and

⁹ For example, overemployed persons are unlikely to be among the most financially disadvantaged persons in the community (e.g. depend on income support payments). This does not imply the overemployed are of no interest to researchers – for example, work-family issues may play a prominent role in determining overemployment – but the motivations for examining overemployment are likely to be quite different to the motivations for investigating underemployment.

overemployment – there is certainly no economic model that nests all three states. For example, it is quite possible that the same characteristics associated with a higher level of underemployment are also associated with a higher level of overemployment. Second, taking an approach where the outcome of interest is the difference between preferred and actual hours precludes examination of measures of underemployment consistent with previous research and the ILO (1998). For example, the ILO measure suggests the full-time employed cannot be underemployed, irrespective of preferred hours. Third, it should be noted that while employed respondents to the HILDA survey were asked about preferred hours at their current wage rate, non-employed respondents were asked about their preferred hours at their *reservation* wage rate. These are two distinct variables that are not, strictly speaking, comparable.¹⁰

5. Descriptive Statistics

5.1. *The extent of underemployment*

Table 5.1 presents statistics on the proportion of individuals who express a desire to work a different number of hours of work than currently being worked (and who are at least marginally attached to the labour force). This is not intended to provide information on the extent of underemployment, but rather provide a context, in terms of preferences over working time, for the measures of underemployment presented. Over 45 per cent of persons aged 15 to 64 years express a preference for working different hours than they are currently working. Females are more likely than males to prefer more hours, while males are more likely than females to prefer fewer hours.¹¹

Patterns for underutilisation and overemployment among employed persons are similar to those for all persons. The important difference is that the rate of underutilisation is almost 10 percentage points lower, while the rate of overemployment is somewhat higher, reflecting the fact that only employed persons can be overemployed. As might be expected, underutilisation is primarily associated with part-time or casual employment, while overemployment is primarily associated with full-time employment. Significantly, given full-time or part-time employment, males are more likely than females to prefer more hours, while females are more likely than males to prefer fewer hours. Among casual workers, males and females are similar in their propensity to prefer more hours, with more than one third stating they would like to work more hours. Casually employed males are, however, slightly more likely to prefer fewer hours (at 15 per cent of casually employed males, versus 11 per cent for females).

¹⁰ The more general approach has been advocated by researchers at FaCS and, notwithstanding the concerns raised here, may therefore be worth pursuing in a future research project with a broader scope than the current project.

¹¹ As noted earlier, information gathered on preferred hours of work is different for non-employed persons to that gathered for employed persons. The non-employed are first asked their reservation wage (the minimum wage at which they would be prepared to work) and then asked how many hours they would like to work at that wage. Employed persons are asked their preferred hours of work, taking into account the effect this would have on their income, thereby implicitly obtaining their labour supply at their current wage rate. In general, we would expect the actual wage to exceed the reservation wage for the employed and be less than the reservation wage for the non-employed. If labour supply is increasing in the wage rate, this implies underutilisation is overstated for the non-employed relative to the employed.

Table 5.1: Persons who want more hours and persons who want fewer hours – Workforce age persons – Proportion of the population and proportion of employed persons (%)

	Underutilised		Overemployed	
	Males	Females	Males	Females
<i>Population aged 15-64 years</i>				
<i>All persons</i>	25.1 (0.40)		20.4 (0.37)	
By sex	23.7 (0.56)	26.6 (0.56)	23.7 (0.56)	17.1 (0.48)
<i>Employed persons aged 15-64 years</i>				
<i>All</i>	15.9 (0.55)	17.2 (0.60)	30.6 (0.69)	27.3 (0.71)
By employment type:				
Full-time	9.4 (0.50)	4.9 (0.51)	35.9 (0.83)	43.2 (1.16)
Part-time	38.9 (2.94)	21.4 (1.30)	9.6 (1.77)	13.7 (1.09)
Casual	35.7 (1.73)	34.8 (1.43)	14.8 (1.28)	11.3 (0.95)

Notes:

Standard errors in parentheses.

Underutilised: Persons with a marginal or greater attachment to the labour force wanting more hours of work.

Overemployed: Employed persons wanting fewer hours of work.

A person is marginally attached to the labour force if he or she: (i) is not available to start work in the reference week, but wants to work and is actively looking for work; or (ii) is not actively looking for work, but wants to work and is available to start work within 4 four weeks.

Among persons aged 15-64 years, 89.0% of males and 78.3% of females have a marginal or greater attachment to the labour force; and 83.6% of males and 66.6% of females are in the labour force.

Table 5.2 presents estimates of time-related labour underutilisation of those with a marginal or greater attachment to the labour force, expressed as a proportion of the workforce-age population. Column (A) presents total underutilisation, and columns (B) to (E) the components of column (A). Column (B) comprises underutilisation of persons marginally attached to the labour force, and column (C) comprises unemployment. Column (D) contains estimates that approximately correspond to the ABS (and ILO) definition of underemployment. Column (E) comprises estimates of full-time worker underemployment, which might be included in a broader measure of underemployment.

The top panel presents estimates for the headcount measure of underemployment and the lower three panels present estimates for volume measures. The headcount measure tells us the proportion of people who are underutilised (and what proportion is in each category of underutilisation), while the volume measure tells us the proportion of hours being ‘supplied’ that is not being utilised (and disaggregated by type of underutilisation), under the assumption that supply is equal to actual hours of employment for those not underemployed (i.e., there is no overemployment). The headcount measure is important because it tells us how many people are affected by underutilisation, including how many are in each type of underutilisation group. The volume measures are, however, more informative in terms of the magnitude of underutilisation, and in particular the relative importance of the different types of underutilisation.¹²

¹² Preferred weekly hours are assumed to be 20 if preferred hours are not recorded (missing) and a person is either marginally attached to the labour force or unemployed and looking for part-time work. Preferred weekly hours are assumed to be 35 if the preferred weekly hours variable is missing and a person is unemployed and looking for full-time work. This affects 95 marginally attached persons and 43 unemployed persons.

Table 5.2: Underutilisation, unemployment and underemployment among the workforce-age (15-64 years) population (%)

	(A)	(B)	(C)	(D)	(E)
	Underutilisation	Underutilisation of marginally attached persons	Unemployment	PT worker underemployment	FT worker underemployment
<i>Headcount measure</i>					
Persons	25.1 (0.40)	8.6 (0.26)	5.0 (0.20)	7.2 (0.24)	4.4 (0.19)
Males	23.7 (0.56)	5.4 (0.30)	6.0 (0.32)	5.5 (0.30)	6.8 (0.33)
Females	26.6 (0.56)	11.8 (0.41)	4.1 (0.25)	8.8 (0.36)	2.0 (0.18)
<i>Volume measure 1: Full-time workers can be underemployed</i>					
Persons	17.2 (0.37)	6.9 (0.25)	5.7 (0.27)	3.3 (0.14)	1.4 (0.08)
Males	14.1 (0.44)	3.9 (0.27)	6.2 (0.35)	2.3 (0.16)	1.8 (0.11)
Females	22.0 (0.59)	11.5 (0.48)	5.0 (0.36)	4.8 (0.24)	0.7 (0.09)
<i>Volume measure 2: Only part-time workers can be underemployed (a)</i>					
Persons	16.9 (0.36)	7.6 (0.28)	6.0 (0.27)	3.2 (0.13)	0
Males	13.2 (0.48)	4.4 (0.28)	6.6 (0.37)	2.2 (0.16)	0
Females	21.9 (0.62)	12.1 (0.48)	5.2 (0.36)	4.6 (0.24)	0
<i>Volume measure 3: Only part-time workers can be underemployed (b)</i>					
Persons	13.5 (0.33)	6.1 (0.22)	4.8 (0.22)	2.6 (0.11)	0
Males	10.1 (0.38)	3.4 (0.23)	5.1 (0.29)	1.7 (0.12)	0
Females	18.8 (0.56)	10.4 (0.44)	4.4 (0.32)	4.0 (0.20)	0

Notes:

Standard errors in parentheses.

Column (A) is comprised of the components in columns (B) to (E).

Volume measure: Number of additional hours wanted as a proportion of total hours wanted by underutilised persons plus actual hours worked by other employed persons:

- *Volume measure 1*: Reported preferred and actual weekly hours are used for all persons with a marginal or greater attachment to the labour force.
- *Volume measure 2*: Preferred weekly hours are at most 35, and all full-time employees are assigned working time of 35 hours per week, regardless of working hours reported.
- *Volume measure 3*: Preferred weekly hours are at most 35, unless actual hours exceed 35, in which case preferred hours equal actual hours.

Underutilised: All persons who have a marginal or greater attachment to the labour force and want more hours of work; *Marginally attached & underutilised*: Persons who have a marginal attachment to the labour force and want more hours of work; *Unemployed*: Unemployed persons; *PT & underemployed*: All part-time employed persons who want more hours of work; *FT & underemployed*: All full-time employed persons who want more hours of work.

Three alternative volume measures are presented in Table 5.2. The first is a relatively ‘pure’ measure, equal to the difference between desired and actual usual hours for all employed persons who prefer more hours, expressed as a proportion of total desired hours of employed persons. The second and third measures assume only part-time workers can be underemployed, and constrain the extent of an individual’s underemployment to be at most 35 minus actual usual hours. The second measure expresses this part-time worker underemployment as a proportion of preferred hours of part-time workers plus 35 for each full-time worker, while the third measure

expresses it as a proportion of preferred hours of part-time workers plus actual usual hours of full-time workers.

To assist in the interpretation of these three alternative volume measures, consider the three volume estimates of part-time worker underemployment for persons presented in Table 5.2 (Column (D)). Each measure presents an estimate of the additional hours desired by part-time workers as a proportion of total desired hours. The estimate for volume measure 1 (3.3 per cent) is simply total additional hours desired by part-time workers as a proportion of total desired hours by persons aged 15-64 years (with desired hours set equal to actual hours for those who prefer to work fewer than actual hours). The estimate for volume measure 2 (3.2 per cent) is the same statistic, but with total desired and actual hours constrained to a maximum of 35 (so a person working 30 hours who prefers 40 hours has underemployment reduced from 10 to 5 hours compared with volume measure 1). Volume measure 3 (2.6 per cent) similarly constrains maximum preferred hours for part-time workers to 35, but sets preferred hours equal to actual hours for full-time workers. Thus, as is the case for volume measure 2, preferred and actual hours are always equal for full-time workers, but are higher than for volume measure 2 for those who work more than 35 hours. Consequently, the estimates for volume measure 3 are always lower than estimates for volume measure 2.

Volume measures are smaller than headcount measures for all groups other than the unemployed, reflecting the fact that marginally attached persons generally want fewer hours than are on average being worked by employed persons, and underemployed persons are partially employed. Unemployed persons generally want full-time employment, which corresponds to more hours than is on average worked by employed persons; consequently, the volume measure is greater than the headcount measure for the unemployed.

The volume measure estimates show that unemployment is, by a significant margin, the most important source of underutilisation of labour for males. However, it is worth noting that, alone, unemployment accounts for less than half of the underutilisation of male labour. For females, it appears that unemployment is a very poor indicator of the total extent of labour underutilisation, accounting for less than one quarter of the shortfall of actual hours from desired hours of employment. Underemployment among part-time employed females is almost as important as unemployment, while additional hours sought by marginally attached females are over double those sought by unemployed females. Total underutilisation is also over 50 per cent higher among females than males, at 22 per cent compared with 14 per cent.

The important impression from Table 5.2 is, therefore, that labour underutilisation is significantly greater than the unemployment rate leads us to believe, and is significantly greater for females than males. Caution is warranted, however, since we are unable to ascertain the extent to which family and other commitments are constraining hours of work, as opposed to insufficient labour demand. It may be that such constraints are more important for females, and the shortfall of actual hours from desired hours due to such factors does not in fact constitute true underemployment.¹³

¹³ The unit record file does contain a variable 'main reason not full-time employed' for those employed part-time, which does allow distinguishing supply-related from demand-related reasons for working part-time. However, this variable can only partially identify underemployment among part-time workers that is due to demand constraints. This is because a part-time employee:

- may want more hours, but not full-time employment; or
- may report the *main* reason for not being full-time as a supply-related reason, even though inability to obtain full-time employment is *one* reason (since the main reason need not be the only reason).

(Of the 905 part-time employees who say they want more hours, only 229 say the main reason they work part-time is because they can't obtain full-time employment. Also interesting is that, of the 288 part-time employees who say the main reason they work part-time is they can't obtain full-time employment, 48 want to work the same hours as

Table 5.3 presents measures of underemployment among employed persons. The first two columns provide information on the extent of underemployment among all employed persons. Estimates of underemployment among all employed persons are presented for part-time and full-time workers separately, with the former group representing the closest approximation to the ILO definition of underemployment. The third column presents the extent of underemployment among part-time workers only.

Table 5.3: Underemployment among employed persons (%)

	As a proportion of all employed persons		As a proportion of part-time employed persons
	PT & underemp.	FT & underemp.	PT & underemp.
<i>Headcount Measure</i>			
Persons	10.2 (0.33)	6.2 (0.26)	34.9 (0.93)
Males	7.1 (0.39)	8.7 (0.42)	46.0 (1.89)
Females	14.1 (0.55)	3.1 (0.28)	30.3 (1.05)
<i>Volume Measure*</i>			
Persons	3.7 (0.15)	1.6 (0.09)	20.5 (0.64)
Males	2.5 (0.18)	2.0 (0.12)	27.2 (1.27)
Females	5.7 (0.29)	0.9 (0.11)	17.4 (0.72)

Notes:

* Only Volume Measure 1 is reported.

Standard errors reported in parentheses.

PT & underemp.: Employed part-time and want more hours of work; *FT & underemp.*: Employed full-time and want more hours of work.

Over one in six employed persons is affected by underemployment, with the majority of these employed part-time. However, for males underemployment is in fact more frequently associated with full-time employment. The volume measure of underemployment indicates that the number of supplied hours by employed persons that is not utilised is higher for part-time workers, for both males and females. That is, for males, 2.5 per cent of supplied hours are unutilised hours of part-time workers, compared with 2 per cent of supplied hours being unutilised hours of full-time workers. For females, 5.7 per cent of supplied hours are unutilised hours of part-time workers, and 0.9 per cent of supplied hours are unutilised hours supplied by full-time workers.

That underemployment is very common among part-time workers, and is a significant problem for such workers, is evident from the third data column of Table 5.3. Over one third of part-time workers are underemployed, and one fifth of the hours supplied by such workers are not utilised. Underemployment among part-time workers is particularly high for males, with the underutilisation rate at 27.2 per cent, compared with 17.4 per cent for females.

The mean extent of underemployment among the underemployed is presented in Table 5.4, where the extent of underemployment is defined to be the mean difference between desired and actual hours of work (which is, by definition, positive for all underemployed persons). Underemployed part-time workers on average desire 13 more hours of work per week, while full-time workers who are underemployed on average desire just over 9 more hours per week. Thus, although part-time workers desire more additional hours, the additional hours wanted by

they currently work, and 8 want fewer hours. This implies that, for these individuals, another reason for working part-time exists – they don't want to work more hours – but for some reason respondents do not believe this to be the main reason for their part-time employment status.)

full-time workers who are underemployed are nonetheless of significant proportions. The bottom panel of Table 5.4 also shows that mean extent of underemployment is higher for males than females, among both part-time and full-time underemployed workers.

Table 5.4: Extent of underemployment among the underemployed – Difference between desired and actual hours.

	Part-time employed		Full-time employed	
Persons				
Mean	13.09 (0.280)		9.22 (0.255)	
Median	10.0 (0.50)		8.0 (0.73)	
Standard deviation	8.38 (0.258)		5.53 (0.330)	
Inter-quartile range	10.0 (0.85)		5.0 (0.93)	
By sex				
	Males	Females	Males	Females
Mean	14.34 (0.521)	12.29 (0.320)	9.45 (0.292)	8.41 (0.516)
Median	12.0 (0.90)	10.0 (0.23)	9.0 (0.83)	7.0 (0.83)
Standard deviation	9.25 (0.438)	7.69 (0.297)	5.59 (0.352)	5.26 (0.765)
Inter-quartile range	13.0 (1.09)	10.0 (0.75)	7.0 (0.92)	5.0 (0.62)

Notes:

Standard errors reported in parentheses.

'Underemployed' means preferred hours of work exceed actual hours of work. The measured extent of underemployment is based on Volume Measure 1.

To provide additional information on the distribution of the extent of underemployment among the underemployed, Table 5.4 presents the median, standard deviation and inter-quartile range. The medians presented are all below corresponding means, implying most underemployed persons have less than the mean level of underemployment. Dispersion, as measured by the standard deviation and inter-quartile range, is greater for the part-time employed than the full-time employed, reflecting the greater scope for variation in the extent of underemployment among part-time workers. Dispersion is also greater for males compared with females.

Only a limited number of comparisons of the incidence of underemployment across different population subgroups are presented in this descriptive section. Detailed examination of the characteristics associated with a higher incidence (and extent) of underemployment is reserved for the regression analysis presented in Section 7. This is because the regression approach can identify associations holding all other characteristics constant. For example, differences in underemployment by age could reflect other differences between persons of different ages (for example, family type, educational attainment, etc.), rather than age differences per se. A regression approach can identify the association between age and underemployment, controlling for (holding constant) other characteristics, such as family type and educational attainment.¹⁴ Table 5.5 compares headcount estimates of underemployment across population groups defined by age, ethnicity/country of birth, location of residence, income unit type and educational

¹⁴ A similar rationale motivates the regression approach to examining the effects of underemployment on outcomes in Section 6.

attainment.¹⁵ The first two columns of Table 5.5 present, for males and females respectively, the proportion underemployed under the ‘standard’ definition of underemployment, comprising those who are employed part-time and prefer to work more hours. The last two columns present estimates for the additional group considered in this study, full-time workers who would like to work more hours.

Table 5.5: Headcount measures of underemployment – Comparisons across population subgroups – Expressed as a proportion of all persons in the population subgroup.

	Part-time & underemployed		Full-time & underemployed	
	Males	Females	Males	Females
<i>Age group (years):</i>				
15-24	12.7 (1.01)	13.8 (1.03)	7.1 (0.78)	3.7 (0.57)
25-34	4.3 (0.59)	8.7 (0.75)	12.1 (0.94)	2.3 (0.40)
35-44	3.6 (0.50)	10.4 (0.76)	6.9 (0.67)	2.0 (0.35)
45-54	3.0 (0.50)	6.0 (0.67)	4.3 (0.59)	0.9 (0.27)
55-64	3.5 (0.64)	3.3 (0.61)	1.3 (0.39)	0.2 (0.17)
<i>Ethnicity/Country of birth:</i>				
ATSI	9.0 (2.98)	6.6 (2.03)	8.9 (2.97)	1.5 (0.99)
Other native-born	5.8 (0.36)	9.1 (0.43)	6.5 (0.38)	1.9 (0.20)
ESB immigrants	3.4 (0.73)	7.9 (1.10)	4.2 (0.80)	1.4 (0.48)
NESB immigrants	5.4 (0.80)	8.3 (0.91)	9.2 (1.02)	2.7 (0.53)
<i>Location of residence:</i>				
Major city	5.5 (0.39)	8.4 (0.46)	7.0 (0.44)	2.4 (0.25)
Other location	5.7 (0.48)	9.6 (0.59)	6.2 (0.50)	1.1 (0.21)
<i>Income unit type:</i>				
Couple with dep. children	5.3 (0.46)	9.3 (0.58)	5.7 (0.48)	0.6 (0.16)
Couple	2.9 (0.43)	6.2 (0.57)	4.9 (0.54)	1.8 (0.31)
Sole parent	10.0 (2.32)	11.9 (1.34)	1.8 (1.02)	1.0 (0.42)
Single person	7.9 (0.66)	10.2 (0.84)	10.3 (0.75)	4.8 (0.59)
<i>Educational attainment:</i>				
Degree	3.6 (0.57)	7.7 (0.73)	5.3 (0.69)	1.6 (0.35)
Other post-school	3.8 (0.40)	8.5 (0.65)	8.4 (0.58)	2.6 (0.37)
Completed high school	11.3 (1.23)	12.2 (1.19)	6.2 (0.94)	3.2 (0.64)
Did not complete high school	4.9 (0.59)	7.8 (0.62)	7.1 (0.70)	1.4 (0.27)
<i>Disability status:</i>				
Disability	4.1 (0.68)	5.4 (0.81)	3.3 (0.61)	4.5 (0.24)
No disability	5.8 (0.33)	9.3 (0.39)	7.3 (0.37)	2.2 (0.20)

Note: Standard errors in parentheses.

¹⁵ See Appendix A for details on the definitions and derivations of the variables used to define population subgroups.

Part-time underemployment is much higher among young people, sole parents and single people, and those whose highest educational attainment is ‘completed high school’. Aside from the generally higher levels of part-time worker underemployment for females compared with males, patterns across population subgroups are broadly similar to males. One difference is that the point estimate for part-time underemployment among indigenous males is over 50 per cent higher than that for other native-born males; however, the small sample size for the former group means the difference is not statistically significant.¹⁶

As noted earlier, the rate of full-time worker underemployment is higher for males than the rate of part-time worker underemployment, whereas comparatively few females are underemployed and employed full-time. For males, the rate of occurrence of full-time worker underemployment is highest among those aged 25-34 years. This at least in part reflects the higher rate of full-time employment among this age group than among younger persons. It is nonetheless interesting because of the contrast it offers with the pattern for females, among whom the rate of full-time worker underemployment is monotonically decreasing in age – although this also probably reflects, to some degree, the relatively lower rate of full-time employment among older females compared with males.

Both male and female NESB immigrants have a comparatively high incidence of full-time worker underemployment, but not part-time underemployment. Similarly, the rate of occurrence of full-time worker underemployment also appears to be slightly higher in major cities than in other areas for both males and females, whereas the rate of occurrence of part-time worker underemployment is slightly lower. Sole parents have a very low rate of full-time employment, so unsurprisingly also have a low rate of full-time worker underemployment, in contrast to the high rate of part-time worker underemployment for this group. A final interesting feature of Table 5.5 is that persons with a disability tend to have a lower incidence of underemployment, which probably reflects lower employment rates, but may also reflect preferences for fewer hours of work because of limitations created by the disability.

5.2. Outcomes and characteristics of the underemployed

Descriptive comparisons of underemployed workers with both unemployed persons and fully employed workers are presented in Table 5.6, for the restricted definition of underemployment (whereby only part-time workers can be underemployed). The main motivation for employing the restricted definition is comparability with previous research. The HILDA dataset contains data items allowing construction of an enormous number of variables for characteristics and outcomes. Table 5.6 restricts these to a relatively succinct set of variables for characteristics and outcomes that are likely to be relevant to, or affected by, labour market outcomes (i.e. whether unemployed, underemployed or fully employed). Only sample means are presented.

The primary question is whether the underemployed look more like the unemployed or the fully employed, somewhere in-between, or indeed, different altogether. The descriptive statistics presented suggest that they are somewhere in-between on many counts. This is particularly true for variables which could be viewed as reflecting the outcomes experienced by the underemployed: sample means of the variables for life satisfaction, income support receipt, income, experience of financial difficulty and employment histories imply that outcomes are, on average, worst for the unemployed and best for the fully employed. For most of these outcomes, the underemployed are very close to midway between the unemployed and fully employed. Mean job satisfaction is also significantly lower among the underemployed compared with the

¹⁶ Less than 2% of the (weighted) sample aged 15-64 years identified as an Aboriginal or Torres Strait Islander.

fully employed. Interestingly, however, mean wages are not significantly lower for the underemployed.¹⁷

Sample means of variables that tend to reflect characteristics rather than outcomes are generally less straightforward to characterise. Exceptions to this are the means for the incidence of disability, the local unemployment rate and the socio-economic rating of the region (SEIFA decile), all of which are ordered from 'worst' for the unemployed to 'best' for the fully employed. Differences in the gender, age, immigrant, income unit type and educational attainment composition across the unemployed, underemployed and fully employed, by contrast, do not have such a natural ordering. Approximately 40 per cent of both the unemployed and fully employed are female, whereas females account for over 60 per cent of the underemployed. The mean age of underemployed females is between that of the unemployed and the fully employed, but underemployed males tend to be younger than both the fully employed and unemployed males. ESB immigrants represent a smaller share of the underemployed than either of the other two groups. The underemployed tend to be closer to the unemployed than the fully employed in terms of income unit composition, except that they are more likely to be part of a couple with dependent children. Indeed, interesting is that, for both males and females, the average number of dependent children of underemployed workers is not only higher than the average for the unemployed, but also the fully employed.¹⁸ This raises the prospect that family commitments could, in part, be the source of underemployment, although it is also possible that increased need for financial resources for persons with dependent children could make them more prone to underemployment.

Educational attainment is highest for the fully employed and lowest for the unemployed. Notable, however, is the large proportion of the underemployed whose highest qualification is completed high school, and comparatively low proportion with post-school qualifications other than a bachelor's degree.

Also associated with underemployment is a relatively high mean number of jobs held in the year previous to the survey. Consistent with having inadequate hours of work, the proportion actively seeking work is substantially higher for underemployed workers than for other workers: 34 per cent of underemployed males and 20 per cent of underemployed females actively sought work in the four weeks preceding the survey interview, compared with 13 per cent of other workers. That the difference between underemployed and other workers is smaller for females suggests they may have a greater tendency to be working less than desired hours because of factors such as family commitments, rather than because of insufficient labour demand.

A further notable feature is that hours worked one year ago are on average higher than current hours for the underemployed, and lower for the fully employed. A possible inference is that there has, on average, been some adverse labour market event in the past year causing hours to drop for the underemployed.

¹⁷ This could potentially reflect the part-time worker composition effect, but this is refuted by the evidence presented in Table 5.7.

¹⁸ The average number of dependent children is taken over all persons (i.e. including persons without dependent children).

Table 5.6: Characteristics of the underemployed, unemployed and fully employed

	Unemp.	Underemp.	Emp.			
Proportion male (%)	60.0 (1.99)	38.8 (1.63)	57.5 (0.57)			
	Males			Females		
	Unemp.	Underemp.	Emp.	Unemp.	Underemp.	Emp.
Age (years)	32.4 (0.72)	30.8 (0.78)	38.5 (0.19)	31.2 (0.82)	33.1 (0.51)	37.8 (0.21)
ATSI (%)	5.5 (1.22)	2.5 (0.87)	0.9 (0.14)	5.5 (1.43)	1.6 (0.53)	1.3 (0.20)
ESB immigrant (%)	11.0 (1.67)	6.6 (1.40)	11.5 (0.49)	10.2 (1.90)	8.7 (1.17)	10.2 (0.52)
NESB immigrant (%)	22.0 (2.22)	16.2 (2.07)	14.8 (0.55)	19.0 (2.46)	16.4 (1.54)	13.8 (0.60)
Reside in major city (%)	65.4 (2.55)	63.3 (2.71)	64.6 (0.75)	63.0 (3.02)	61.2 (2.03)	65.9 (0.82)
Income unit type (%):						
Couple with dependents	25.4 (2.33)	36.4 (2.71)	40.5 (0.77)	34.7 (2.98)	40.0 (2.04)	35.5 (0.83)
Couple	15.7 (1.95)	14.6 (1.99)	29.5 (0.71)	19.1 (2.46)	21.6 (1.71)	32.8 (0.81)
Sole parent	5.6 (1.24)	5.1 (1.24)	1.5 (0.19)	15.9 (2.29)	12.2 (1.36)	5.9 (0.41)
Single	53.2 (2.67)	43.9 (2.80)	28.5 (0.70)	30.3 (2.88)	26.2 (1.83)	25.8 (0.76)
No. of dependents	0.57 (0.054)	0.86 (0.068)	0.83 (0.018)	0.9 (0.07)	1.05 (0.05)	0.77 (0.019)
Educational attainment (%):						
Degree	7.9 (1.45)	12.6 (1.87)	23.3 (0.66)	12.1 (2.04)	18.9 (1.63)	29.2 (0.79)
Other P-S qual.	35.0 (2.56)	27.1 (2.50)	42.6 (0.77)	28.4 (2.83)	28.8 (1.88)	32.7 (0.81)
CHS	12.5 (1.77)	26.2 (2.48)	12.1 (0.51)	10.8 (1.95)	18.0 (1.60)	13.5 (0.59)
NCHS	37.2 (2.59)	20.3 (2.27)	20.3 (0.63)	36.6 (3.02)	26.4 (1.84)	21.6 (0.71)
At school	7.4 (1.40)	13.8 (1.94)	1.7 (0.20)	12.1 (2.04)	7.8 (1.12)	3.0 (0.29)
Local unemployment rate (%)	7.79 (0.097)	7.63 (0.124)	7.36 (0.031)	7.85 (0.122)	7.48 (0.085)	7.34 (0.034)
SEIFA decile	5.1 (0.15)	5.8 (0.16)	6.1 (0.04)	5.7 (0.17)	5.9 (0.12)	6.1 (0.05)
Disabled (%)	19.3 (2.12)	10.8 (1.75)	7.6 (0.41)	9.9 (1.87)	7.6 (1.10)	6.8 (0.44)

Notes: Standard errors in parentheses. A person is defined to be underemployed only if employed part-time and preferred hours of work exceed actual hours of work. See Appendix A for detailed explanation of the characteristics.

Table 5.6 continued: Characteristics of the underemployed, unemployed and fully employed

	Males			Females		
	Unemp.	Underemp.	Emp.	Unemp.	Underemp.	Emp.
Life satisfaction	7.4 (0.11)	7.6 (0.10)	7.9 (0.02)	7.3 (0.14)	7.7 (0.07)	8.0 (0.03)
Job satisfaction	-	7.1 (0.12)	7.5 (0.03)	-	7.5 (0.09)	7.8 (0.03)
Income unit receives IS (%)	67.9 (2.54)	37.6 (2.80)	9.9 (0.47)	54.8 (3.18)	32.8 (2.01)	12.3 (0.59)
Income unit equivalent income (\$ per year)	17,834 (1,168.9)	26,308 (1,658.2)	43,670 (566.2)	21,100 (1,495.6)	27,052 (1,119.6)	43,469 (628.5)
Income unit income missing (%)	12.4 (1.77)	11.8 (1.82)	13.0 (0.52)	17.3 (2.37)	17.0 (1.56)	16.3 (0.64)
Personal income (\$ per year)	14,597 (1,069.2)	19,631 (1,877.1)	47,609 (660.0)	10,250 (953.1)	16,342 (823.6)	31,121 (442.5)
Personal income missing (%)	7.5 (1.41)	4.7 (1.19)	6.5 (0.38)	8.9 (1.79)	7.4 (1.09)	7.3 (0.45)
Wage (\$ per hour)	-	14.63 (0.908)	18.44 (0.321)	-	20.65 (2.665)	16.95 (0.207)
Wage missing (%)	-	7.8 (1.51)	4.4 (0.32)	-	5.4 (0.94)	5.5 (0.39)
Financial difficulty (%)	65.9 (2.54)	48.4 (2.82)	34.6 (0.74)	59.4 (3.08)	53.5 (2.08)	33.3 (0.81)
Looking for work (%)	100.0 (0.00)	34.2 (2.67)	13.7 (0.54)	100.0 (0.00)	28.0 (1.87)	12.9 (0.58)
No. of jobs in the last year	0.69 (0.039)	1.36 (0.042)	1.21 (0.008)	0.54 (0.042)	1.25 (0.033)	1.25 (0.010)
Prop. of last year employed (%)	36.0 (2.08)	81.0 (1.77)	95.3 (0.26)	26.8 (2.34)	83.6 (1.27)	92.4 (0.37)
Prop. of last year not emp. (%)	52.4 (2.20)	10.6 (1.28)	3.2 (0.20)	56.3 (2.65)	11.5 (1.09)	5.1 (0.30)
Prop. of last year unemp. (%)	45.0 (2.23)	6.8 (1.03)	1.7 (0.14)	33.6 (2.58)	5.2 (0.73)	1.3 (0.14)
Prop. of life unemployed (%)	15.5 (1.11)	3.5 (0.47)	1.9 (0.10)	10.6 (1.26)	3.1 (0.36)	1.1 (0.08)
Prop. of life not employed (%)	22.7 (1.26)	10.1 (0.92)	6.0 (0.18)	31.9 (1.89)	19.6 (0.90)	15.8 (0.33)
Usual weekly hours	0.0 (0.00)	17.6 (0.50)	45.2 (0.22)	0.0 (0.00)	16.3 (0.36)	34.3 (0.25)
Usual hours one year ago	-	21.6 (0.97)	43.5 (0.27)	-	17.9 (0.60)	32.0 (0.29)

Notes: Standard errors in parentheses. A person is defined to be underemployed only if employed part-time and preferred hours of work exceed actual hours of work. See Appendix A for detailed explanation of the characteristics.

Table 5.7 addresses several concerns with the results evident in Table 5.6. First, the differences between the underemployed and fully employed may partly derive from the different part-time/full-time employment type composition of the two groups. Second, the fully employed group contains full-time workers who prefer to work more hours – a dimension of underemployment of potential importance.

Focusing first on comparisons of part-time underemployed and fully employed workers, the ordering of outcomes, from worst for the unemployed to best for the fully employed, is robust to the restriction to part-time workers. As expected, the characteristics composition of fully employed part-time workers more closely matches that of underemployed part-time workers than does that of the group defined as fully employed in Table 5.6. Particularly notable for males is that the incidence of disability is no higher among underemployed part-time workers than among fully employed part-time workers. Also notable is that, among part-time workers, the average number of dependent children is no longer higher for underemployed persons compared with fully employed persons. This implies differences in the part-time/full-time employment composition of underemployed part-time workers and all fully employed workers are indeed driving the overall difference in the average number of dependent children in the two groups.

Table 5.7: Characteristics of unemployed, underemployed and fully employed persons by part-time/full-time employment status

	Unemp.	Part-time employed		Full-time employed		
		Underemp.	Fully emp.	All	Underemp.	Fully emp.
Proportion male	60.0 (1.99)	38.8 (1.63)	24.4 (1.03)	66.4 (0.62)	77.7 (1.92)	65.3 (0.66)
		Males				
Age (years)	32.4 (0.72)	30.8 (0.78)	34.2 (0.85)	38.9 (0.19)	33.1 (0.53)	39.6 (0.20)
ATSI (%)	5.5 (1.22)	2.5 (0.87)	0.8 (0.45)	0.9 (0.15)	2.0 (0.73)	0.7 (0.15)
ESB immigrant (%)	11.0 (1.67)	6.6 (1.40)	8.1 (1.40)	11.9 (0.53)	6.6 (1.30)	12.5 (0.57)
NESB immigrant (%)	22.0 (2.22)	16.2 (2.07)	16.1 (1.89)	14.7 (0.58)	22.6 (2.18)	13.8 (0.60)
Reside in major city (%)	65.4 (2.55)	63.3 (2.71)	69.2 (2.37)	64.1 (0.79)	66.9 (2.46)	63.8 (0.83)
Couple with dependents (%)	25.4 (2.33)	36.4 (2.71)	39.3 (2.51)	40.6 (0.80)	31.9 (2.43)	41.6 (0.85)
Couple (%)	15.7 (1.95)	14.6 (1.99)	25.9 (2.25)	29.9 (0.75)	20.3 (2.10)	31.0 (0.80)
Sole parent (%)	5.6 (1.24)	5.1 (1.24)	6.0 (1.22)	1.1 (0.17)	0.7 (0.45)	1.2 (0.18)
Single (%)	53.2 (2.67)	43.9 (2.80)	28.9 (2.33)	28.4 (0.74)	47.0 (2.61)	26.3 (0.76)
No. of dependents	0.57 (0.054)	0.86 (0.068)	0.88 (0.064)	0.83 (0.019)	0.66 (0.056)	0.85 (0.020)
Degree (%)	7.9 (1.45)	12.6 (1.87)	20.8 (2.09)	23.6 (0.69)	15.3 (1.88)	24.5 (0.74)
Other P-S qual. (%)	35.0 (2.56)	27.1 (2.50)	25.3 (2.23)	44.3 (0.81)	48.8 (2.61)	43.8 (0.86)
CHS (%)	12.5 (1.77)	26.2 (2.48)	21.5 (2.11)	11.2 (0.52)	11.7 (1.68)	11.1 (0.54)
NCHS (%)	37.2 (2.59)	20.3 (2.27)	14.1 (1.79)	20.9 (0.67)	24.2 (2.24)	20.5 (0.70)
At school (%)	7.4 (1.40)	13.8 (1.94)	18.3 (1.98)	0.0 (0.03)	0.0 (0.00)	0.0 (0.03)
Local unemployment rate (%)	7.79 (0.097)	7.63 (0.124)	7.26 (0.103)	7.37 (0.032)	7.58 (0.111)	7.35 (0.034)
SEIFA decile	5.1 (0.15)	5.8 (0.16)	6.0 (0.15)	6.1 (0.05)	5.7 (0.15)	6.2 (0.05)
Disabled (%)	19.3 (2.12)	10.8 (1.75)	11.5 (1.64)	7.2 (0.42)	7.2 (1.35)	7.2 (0.45)
Life satisfaction	7.4 (0.11)	7.6 (0.10)	8.1 (0.07)	7.9 (0.02)	7.5 (0.10)	7.9 (0.03)
Job satisfaction	-	7.1 (0.12)	7.6 (0.10)	7.5 (0.03)	7.4 (0.11)	7.5 (0.03)
Income unit receives IS (%)	67.9 (2.54)	37.6 (2.80)	26.2 (2.28)	8.3 (0.46)	7.0 (1.35)	8.4 (0.49)
Income unit equivalent income (\$ per year)	17,834 (1,168.9)	26,308 (1,658.2)	34,992 (1,659.2)	44,545 (598.6)	33,091 (1,046.5)	45,865 (651.4)
Personal income (\$ per year)	14,597 (1,069.2)	19,631 (1,877.1)	23,888 (1,753.1)	49,963 (692.1)	34,900 (1,002.8)	51,646 (754.2)
Wage (\$ per hour)	-	14.63 (0.91)	17.03 (1.66)	18.58 (0.21)	15.81 (0.42)	18.90 (0.23)
Financial difficulty (%)	65.9 (2.54)	48.4 (2.82)	39.6 (2.51)	34.2 (0.78)	44.5 (2.59)	33.0 (0.81)
Looking for work (%)	100.0 (0.00)	34.2 (2.67)	13.5 (1.75)	13.7 (0.56)	20.5 (2.11)	12.9 (0.58)
Prop. of last year employed (%)	36.0 (2.08)	81.0 (1.77)	83.8 (1.58)	96.4 (0.23)	91.6 (1.14)	96.9 (0.22)
Prop. of last year unemp. (%)	45.0 (2.23)	6.8 (1.03)	2.8 (0.68)	1.6 (0.14)	3.6 (0.65)	1.3 (0.14)
Prop. of life unemployed (%)	15.5 (1.11)	3.5 (0.47)	1.2 (0.27)	1.9 (0.10)	3.4 (0.40)	1.7 (0.10)
Prop. of life not employed (%)	22.7 (1.26)	10.1 (0.92)	7.2 (0.78)	5.9 (0.18)	7.5 (0.64)	5.7 (0.19)
Usual weekly hours	0.0 (0.00)	17.6 (0.50)	18.6 (0.46)	47.8 (0.18)	41.2 (0.33)	48.6 (0.20)
Usual hours one year ago	-	21.6 (0.97)	18.9 (0.81)	46.0 (0.25)	39.7 (0.80)	46.7 (0.26)

Notes: Standard errors in parentheses. A person is defined to be underemployed only if employed part-time and preferred hours of work exceed actual hours of work. See Appendix A for detailed explanation of the characteristics.

Table 5.7 continued: Characteristics of unemployed, underemployed and fully employed persons by part-time/full-time employment status – Females

	Unemp.	Part-time employed		Full-time employed		
		Underemp.	Fully emp.	All	Underemp.	Fully emp.
Age (years)	31.2 (0.82)	33.1 (0.51)	38.1 (0.35)	37.6 (0.26)	30.8 (1.08)	38.0 (0.26)
ATSI (%)	5.5 (1.43)	1.6 (0.53)	1.6 (0.34)	1.2 (0.24)	1.7 (1.26)	1.2 (0.25)
ESB immigrant (%)	10.2 (1.90)	8.7 (1.17)	9.6 (0.80)	10.6 (0.69)	6.9 (2.49)	10.8 (0.71)
NESB immigrant (%)	19.0 (2.46)	16.4 (1.54)	11.0 (0.85)	15.5 (0.81)	24.1 (4.21)	14.9 (0.82)
Reside in major city (%)	63.0 (3.02)	61.2 (2.03)	61.3 (1.33)	68.6 (1.04)	79.1 (4.00)	68.0 (1.07)
Couple with dependents (%)	34.7 (2.98)	40.0 (2.04)	55.3 (1.35)	23.5 (0.95)	12.4 (3.25)	24.2 (0.98)
Couple (%)	19.1 (2.46)	21.6 (1.71)	25.0 (1.18)	37.5 (1.08)	27.5 (4.40)	38.1 (1.12)
Sole parent (%)	15.9 (2.29)	12.2 (1.36)	7.2 (0.70)	5.2 (0.49)	4.8 (2.11)	5.2 (0.51)
Single (%)	30.3 (2.88)	26.2 (1.83)	12.5 (0.90)	33.9 (1.06)	55.3 (4.90)	32.5 (1.08)
No. of dependents	0.9 (0.07)	1.05 (0.05)	1.22 (0.033)	0.49 (0.020)	0.33 (0.082)	0.50 (0.021)
Degree (%)	12.1 (2.04)	18.9 (1.63)	22.3 (1.13)	33.4 (1.05)	18.0 (3.79)	34.4 (1.09)
Other P-S qual (%)	28.4 (2.83)	28.8 (1.88)	30.9 (1.26)	33.8 (1.06)	39.7 (4.82)	33.4 (1.08)
CHS (%)	10.8 (1.95)	18.0 (1.60)	14.6 (0.96)	12.8 (0.75)	21.2 (4.03)	12.3 (0.75)
NCHS (%)	36.6 (3.02)	26.4 (1.84)	24.3 (1.17)	20.0 (0.89)	21.1 (4.02)	19.9 (0.92)
At school (%)	12.1 (2.04)	7.8 (1.12)	7.8 (0.73)	0.1 (0.05)	0.0 (0.00)	0.1 (0.06)
Local unemployment rate (%)	7.85 (0.122)	7.48 (0.085)	7.39 (0.054)	7.30 (0.045)	7.06 (0.190)	7.32 (0.046)
SEIFA decile	5.7 (0.17)	5.9 (0.12)	6.3 (0.08)	6.0 (0.06)	5.5 (0.28)	6.1 (0.06)
Disabled (%)	9.9 (1.87)	7.6 (1.10)	7.9 (0.73)	6.1 (0.54)	2.8 (1.64)	6.3 (0.56)
Life satisfaction	7.3 (0.14)	7.7 (0.07)	8.2 (0.04)	7.9 (0.03)	7.8 (0.14)	7.9 (0.03)
Job satisfaction	-	7.5 (0.09)	8.0 (0.05)	7.6 (0.04)	7.3 (0.24)	7.6 (0.04)
Income unit receives IS (%)	54.8 (3.18)	32.8 (2.01)	21.5 (1.16)	6.8 (0.58)	9.8 (3.02)	6.7 (0.59)
Income unit equiv. income (\$)	21,100 (1,495.6)	27,052 (1,119.6)	38824 (960.1)	46126 (818.5)	33638 (2250.0)	46922 (853.1)
Personal income (\$ per year)	10,250 (953.1)	16,342 (823.6)	20587 (604.7)	37447 (564.8)	28805 (1714.6)	37984 (587.1)
Wage (\$ per hour)	-	20.65 (2.67)	17.16 (0.43)	16.82 (0.20)	14.02 (0.55)	16.99 (0.21)
Financial difficulty (%)	59.4 (3.08)	53.5 (2.08)	37.5 (1.32)	30.8 (1.03)	42.8 (4.87)	30.0 (1.05)
Looking for work (%)	100.0 (0.00)	28.0 (1.87)	9.3 (0.79)	15.1 (0.80)	24.8 (4.26)	14.5 (0.81)
Prop. of last year employed (%)	26.8 (2.34)	83.6 (1.27)	88.6 (0.71)	94.8 (0.40)	88.4 (2.46)	95.1 (0.40)
Prop. of last year unemp. (%)	33.6 (2.58)	5.2 (0.73)	1.4 (0.25)	1.2 (0.16)	2.4 (0.89)	1.1 (0.16)
Prop. of life unemployed (%)	10.6 (1.26)	3.1 (0.36)	1.1 (0.14)	1.2 (0.10)	1.3 (0.46)	1.1 (0.10)
Prop. of life not employed (%)	31.9 (1.89)	19.6 (0.90)	19.5 (0.58)	13.6 (0.39)	11.8 (1.67)	13.7 (0.41)
Usual weekly hours	0.0 (0.00)	16.3 (0.36)	19.7 (0.23)	43.3 (0.20)	40.0 (0.72)	43.5 (0.21)
Usual hours one year ago	-	17.9 (0.60)	19.2 (0.35)	39.7 (0.32)	36.9 (1.51)	39.9 (0.32)

Notes: Standard errors in parentheses. A person is defined to be underemployed only if employed part-time and preferred hours of work exceed actual hours of work. See Appendix A for detailed explanation of the characteristics.

Although differences between underemployed part-timers and the fully employed do decrease when we restrict the fully employed to part-time workers, a number of differences do persist. Furthermore, an interesting difference to emerge is the higher proportion of the fully employed who live in a major city (69 per cent compared with 63 per cent for the underemployed). Also significant is that males employed part-time are much more likely to be underemployed than females, making up only 24 per cent of fully employed part-time workers, compared with 39 per cent of underemployed part-time workers.

Males are also more likely than females to be underemployed when they are employed on a full-time basis. Males comprise 65 per cent of fully employed full-time workers, but 78 per cent of underemployed full-time workers. Outcomes of full-time employed males who are underemployed are also generally somewhere between those experienced by the unemployed and those of the full-time employed who are fully employed, with one important exception: there is no (statistically significant) difference in rates of income support receipt. Comparison of employment outcomes shows the underemployed to be comparatively low wage earners compared with fully employed – the mean hourly wage rate is \$14.76 compared with \$17.19 – who do indeed work comparatively low hours, with mean hours per week 41 compared with 49 for the fully employed. Interestingly, job satisfaction is not significantly different between the two groups. However, this is perhaps not surprising, since excessive disutility of work would discourage a preference for more of it.

Comparing characteristics of underemployed and fully employed full-time male workers, the underemployed are on average young, more likely to have not completed high school or to have obtained a non-degree post-school qualification (perhaps trade qualifications), more likely to be an NESB immigrant and much more likely to be single. Although significantly more educated than the unemployed, they are, on average, somewhat similar to the unemployed in terms of age, immigrant status and income unit type.

Full-time employed females who are underemployed have some similarities to their male counterparts, but also some notable differences. Life satisfaction is not significantly different between the underemployed and fully employed, although incomes and wages of the underemployed are substantially lower. The gap in average hours worked per week is not as great as for males, and employment histories are also somewhat similar for underemployed and fully employed female full-time workers. A further feature of full-time employed females who are underemployed is that they are much more likely to live in a major city: 79 per cent of the underemployed live in a major city, versus 68 per cent for the fully employed.

6. The Outcomes Associated with Underemployment – Model Estimation

The purpose of this section is to investigate the effects on various outcomes that are potentially attributable to underemployment. This is undertaken by regression analysis of the correlation between underemployment and outcomes, controlling for the effects of differences in characteristics other than underemployment status. The primary motivation for the analysis is to ascertain whether underemployment is associated with the adverse outcomes associated with unemployment. The population of interest is therefore persons in the labour force. However, the apparent consequences of underemployment for employment outcomes are also examined. Since these outcomes are only observed for employed persons, the analysis of these outcomes is over employed persons only.¹⁹

¹⁹ A concern that arises with estimation over employed persons only is the potential for so-called ‘selection effects’, whereby coefficient estimates are biased because of the omission of observations for which the dependent variable is not observed. Techniques exist which attempt to control for these selection effects (such as the Heckman selection

Estimates are presented in Table 6.1 of the association between underemployment and:

- whether the income unit was in receipt of income support at the time of the survey;
- income unit equivalent income in the last financial year;
- personal income in the last financial year; and
- life satisfaction at the time of the survey

where the sample includes all persons in the labour force.

Table 6.2 presents estimates, obtained from equations estimated over employed persons only, of the association between underemployment and:

- personal income in the last financial year;
- the wage rate at the time of the survey; and
- job satisfaction at the time of the survey.

The explanatory variable used for underemployment is a dummy variable, rather than the difference between preferred and actual hours – that is, the explanatory variable is whether a person is underemployed, not the extent of underemployment. The motivation for this approach is that primary interest is in comparisons of the effects associated with underemployment with those associated with unemployment. It gives the ‘average’ effect of underemployment on the outcome variable, compared with the ‘average’ effect of unemployment. Investigation of how the outcomes associated with underemployment depend on the extent of underemployment is considered of secondary importance, and not undertaken in this study. However, for all regression equations, the underemployed who are employed on a part-time basis are distinguished from the underemployed who are employed full-time, by employing separate dummy variables for each group.

Controls are included for a variety of personal characteristics (age, educational attainment, family type, number and ages of dependent children, region of residence, country of birth, years since migration, whether indigenous, health and English proficiency), coefficient estimates for which are reported in Appendix B, as well as variables for part-time and casual employment. The effects associated with part-time employment (including casual employment), and with being employed on a casual basis, are included in the main tables to show the distinct effects of part-time and casual employment from underemployment. The principal motivation for the inclusion of these variables is that they will capture part of the effects of underemployment for part-time/casual workers *who prefer to work full-time*. To elaborate, the effect of underemployment for a part-time casual employee who prefers a permanent full-time position is the aggregate of the coefficients on the ‘part-time underemployed’, ‘part-time employed’ and ‘casual employee’ variables.

For employed persons, specifications are also estimated including variables for industry, occupation, tenure with current employer, trade union membership and self-employment status. The interpretation of the regression coefficients is largely one of descriptive association,

model), but no attempt has been made to implement them in this study. This is partly because it is difficult to credibly do so – for example, Heckman selection models require a variable which affects whether the dependent variable is observed, but not its value, and no such variables appear to exist in the HILDA data for the independent variables under study.

although it is reasonable to interpret them as reflecting causal effects, especially for the life satisfaction and job satisfaction models.²⁰

Table 6.1 presents estimates obtained from equations estimated over all persons in the labour force. The dependent variable for Model 1 is a qualitative variable equal to one if the income unit receives income support payments and zero otherwise. For this model, a probit equation is estimated. The probit model is given by:

$$\Pr(y_i = 1 | x_i) = \Phi(\mathbf{x}_i \mathbf{b}) \quad (6.1)$$

where y is the outcome of interest (equal to one or zero), $\Phi(\cdot)$ is the standard cumulative normal distribution, \mathbf{x} is a vector of explanatory variables and \mathbf{b} is the coefficient vector. Coefficient estimates are not readily interpretable for probit models, and the effects of individual explanatory variables on the outcome variable depend on the values of the explanatory variables at which they are evaluated. Table 6.1 therefore reports ‘mean marginal effects’ of the explanatory variables. For a continuous variable, the mean marginal effect is given by:

$$MME_k = (1/n) \sum_{i=1}^n \phi(\mathbf{x}_i \mathbf{b}) b_k \quad (6.2)$$

where MME_k is the mean marginal effect of variable x_k on the predicted probability

$\Pr(y = 1 | x)$, and the summation is over the n individuals in the sample. This is, as the name suggests, the mean marginal effect of the explanatory variable on the predicted probability that the dependent variable takes a value of one, evaluated over all individuals in the sample, and holding all other variables constant at their actual values. For a binary explanatory variable, the marginal effect is obtained by changing the explanatory variable from zero to one for each individual, holding all other variables at their actual values.²¹

Models 2 and 3 have log income as the dependent variable. For Model 2, the income variable is ‘income unit equivalent income’, defined as current-year income unit income from all sources, divided by the square root of the number of members of the income unit.²² For Model 3, the income variable is current-year personal income from all sources. OLS regression estimates are reported for both models in Table 6.1, and can be interpreted as the percentage change in income associated with a one-unit increase in the explanatory variable (evaluated at the midpoint of income before the change and income after the change).

The dependent variable for Model 4 is an index of life satisfaction, where respondents were asked to rate overall satisfaction with life on a scale from zero (completely dissatisfied) to ten (completely satisfied). OLS regression may not be appropriate for such a dependent variable. For example, the improvement in satisfaction associated with a unit-increase in the index may not be the same at all values of the index. For this reason, and because the variable is bounded between

²⁰ Specifications were estimated which included interactions between the variables for underemployment and the variables for personal characteristics. However, none of these interaction terms was statistically significant at the 5% level, possibly reflecting sample size constraints. The number of observations varies across the specifications estimated because of missing values. A sensitivity test (not attempted) could be conducted by, for example, restricting the sample to those who have non-missing values for all variables.

²¹ A more common approach is to evaluate marginal effects at mean values of the explanatory variables. However, this is problematic because no-one is actually at the mean when we have binary explanatory variables and, furthermore, marginal effects can vary substantially, and in a non-linear fashion, with characteristics. Mean marginal effects are therefore more likely to produce representative estimates of the effects of characteristics.

²² An income unit is defined to consist of either a single person or a couple living in the same household, plus any dependent children.

0 and 10, both OLS and ordered probit models were estimated for the life satisfaction variable. Implied effects were very similar for both models, and hence only the OLS estimates, which are much easier to interpret, are reported.

The evidence from Table 6.1 is as follows:

1. *Income unit income support receipt*: For both males and females, underemployment among part-time workers is associated with a significantly higher likelihood of income support receipt by their income unit. The coefficient estimates imply the mean effect of being part-time underemployed is to increase the probability of income support receipt by 0.06 for both males and females. These effects are much smaller than the effects associated with unemployment, which has a mean effect on the probability of income support receipt of 0.59 for males and 0.47 for females. However, it should also be noted that, for a part-time casual employee who prefers full-time work, we can infer that the mean effect of underemployment is to increase the probability of income support receipt by 0.27 for males and by 0.25 for females. In contrast to part-time worker underemployment, full-time worker underemployment appears to have no impact on income support receipt, which is unsurprising given income support eligibility criteria.
2. *Income unit equivalent income*: Part-time worker underemployment is associated with a significant decrease in income for both males and females. As with income support receipt, the decrease is much larger for part-time casual employees who prefer permanent full-time positions. There is no significant effect evident for full-time worker underemployment, although for both males and females the point estimates of the coefficients suggest negative effects that are approximately half the magnitude of the effects associated with part-time underemployment. The effect of underemployment is much smaller than the effect associated with unemployment, which acts to decrease income by 99 per cent for males and 88 per cent for females.
3. *Personal income*: For males, while part-time employment, and being employed on a casual basis are, as might be expected, associated with lower personal income than full-time employment, there is no additional adverse effect associated with being underemployed for such workers. Interestingly, however, underemployment among full-time employees is associated with lower personal income compared with fully employed full-time employees – the coefficient estimate shows a 9 per cent reduction in personal income for an underemployed full-time worker compared with being fully employed (although this is only significant at the 10 per cent level). Based on the evidence in Table 5.7, this is likely to reflect both the lower hours and wage rates of such workers. For females, no significant effect of full-time underemployment is evident, but there is a significant negative effect on personal income associated with part-time worker underemployment. At 15 per cent, however, this is very small compared with the 141 per cent decrease in personal income associated with unemployment.
4. *Life satisfaction*: Part-time underemployment has a large negative impact on the life satisfaction variable for both males and females. Part-time employment is, however, associated with a positive effect on life satisfaction, so that for part-time workers who prefer full-time work, the negative impact of underemployment is actually smaller than the coefficient on the ‘part-time underemployed’ variable would imply – a lot smaller for females. Significantly, being employed on a casual basis is associated with a negative impact on life satisfaction, which for males significantly outweighs the positive effects of part-time employment. Full-time underemployment also has a significant negative effect for males, only slightly smaller than that evident for underemployed part-time workers. Interestingly, for females there is no adverse effect associated with full-time worker underemployment.

Table 6.1: Outcomes associated with underemployment and unemployment – All persons

	<i>Males</i>		<i>Females</i>	
	MME/Coef.	SE	MME/Coef.	SE
1. Income unit income support receipt				
Unemployed	0.591	0.025*	0.468	0.031*
Underemployed – PT	0.056	0.024*	0.056	0.017*
Underemployed – FT	-0.006	0.020	0.016	0.043
Part-time employed	0.137	0.023*	0.099	0.014*
Casual employee	0.078	0.017*	0.092	0.015*
2. Income unit equivalent income				
Unemployed	-0.988	0.049*	-0.881	0.053*
Underemployed – PT	-0.141	0.061*	-0.223	0.038*
Underemployed – FT	-0.072	0.045	-0.111	0.076
Part-time employed	-0.250	0.048*	-0.130	0.031*
Casual employee	-0.209	0.038*	-0.222	0.031*
3. Personal income				
Unemployed	-1.280	0.058*	-1.410	0.068*
Underemployed – PT	0.057	0.073	-0.150	0.048*
Underemployed – FT	-0.090	0.053	-0.050	0.095
Part-time employed	-0.740	0.057*	-0.450	0.038*
Casual employee	-0.290	0.045*	-0.390	0.039*
4. Life satisfaction				
Unemployed	-0.525	0.091*	-0.568	0.104*
Underemployed – PT	-0.350	0.116*	-0.423	0.076*
Underemployed – FT	-0.298	0.085*	-0.064	0.152
Part-time employed	0.081	0.091	0.286	0.060*
Casual employee	-0.208	0.072*	-0.112	0.061

Notes: MME: Mean Marginal Effect. Coef.: Coefficient estimate. SE: Standard error. *Underemployed – PT*: Underemployed and employed part-time. *Underemployed – FT*: Underemployed and employed full-time. Income support receipt estimates are obtained from a probit model, with the reported statistic the mean effect on the probability of income support receipt of a discrete change of the dummy variable from 0 to 1, evaluated over all persons in the sample. Statistics in parentheses are z statistics for the test that the mean marginal effect is zero. Estimates for models 2-4 are OLS coefficient estimates. * indicates significance at the 5% level. Coefficient estimates for all other explanatory variables used in the estimating equations are reported in Appendix B. The dependent variables are (see Appendix A for further details):

1. Income unit currently receives income support payments (dummy variable).
2. Log of income unit equivalent income from all sources in the last financial year.
3. Log of personal income from all sources in the last financial year.
4. Index of life satisfaction.

To summarise the findings presented in Table 6.1, part-time worker underemployment for females is associated with significant negative effects for all four outcomes, while full-time worker underemployment is not associated with any significant effects for females. For males, significant negative effects of part-time worker underemployment are evident for income support receipt, income unit income and life satisfaction, while a significant negative effect of full-time worker underemployment is found for life satisfaction. For both males and females, the negative effects attributable to underemployment are smaller than those attributable to unemployment, generally much smaller. The implication is that underemployment is not as significant a policy

issue as unemployment. However, it is important to note that inferred adverse effects of underemployment on income support receipt and income are substantial for part-time workers who would like to work full-time, particularly those employed on a casual basis, and as such an important target group for government policy.

Table 6.2: Outcomes associated with underemployment – Employed persons

	<i>Males</i>				<i>Females</i>			
	(A)		(B)		(A)		(B)	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
1. Personal income								
Underemployed – PT	0.065	0.070	0.061	0.068	-0.147	0.046*	-0.103	0.046*
Underemployed – FT	-0.090	0.051	-0.070	0.050	-0.055	0.091	-0.033	0.090
Part-time employed	-0.770	0.055*	-0.620	0.055*	-0.457	0.037*	-0.378	0.038*
Casual employee	-0.300	0.043*	-0.270	0.045*	-0.398	0.038*	-0.367	0.040*
2. Wage rate								
Underemployed – PT	0.021	0.042	0.025	0.039	-0.010	0.026	0.013	0.025
Underemployed – FT	-0.028	0.029	-0.013	0.028	-0.032	0.050	-0.002	0.049
Part-time employed	-0.043	0.034	0.054	0.033	0.087	0.021*	0.144	0.021*
Casual employee	-0.071	0.025*	-0.008	0.025	-0.095	0.021*	-0.028	0.021
3. Job satisfaction								
Underemployed – PT	-0.468	0.146*	-0.442	0.146*	-0.424	0.098*	-0.392	0.098*
Underemployed – FT	-0.141	0.107	-0.105	0.107	0.008	0.196	0.062	0.196
Part-time employed	0.168	0.115	0.186	0.118	0.242	0.078*	0.238	0.081*
Casual employee	-0.422	0.091*	-0.374	0.098*	-0.093	0.080	-0.050	0.087

Notes: Coef.: Coefficient estimate. SE: Standard error. *Underemployed – PT*: Underemployed and employed part-time. *Underemployed – FT*: Underemployed and employed full-time. Specification (B) adds to specification (A) controls for industry, occupation, trade union membership, tenure with current employer and self employment status. Statistics reported are OLS coefficient estimates. * indicates significance at the 5% level. Coefficient estimates for all other explanatory variables used in the estimating equations are reported in Appendix B. The dependent variables are:

1. Log of personal income from all sources in the last financial year.
2. Log of the current hourly wage rate.
3. Index of overall job satisfaction.

Table 6.2 presents OLS regression coefficient estimates estimated over employed persons only. Two specifications are estimated for each of the three outcomes examined, the first using the same controls as in Table 6.1, the second adding employment variables. Model 1 has the same dependent variable as Model 3 in Table 6.1, and is presented to examine the effects of adding employment controls. The dependent variable in Model 2 is the log hourly wage rate, while in Model 3 the dependent variable is an index of job satisfaction, similar to the life satisfaction index used in Model 4 in Table 6.1.²³ Results are as follows:

1. *Personal income*: The negative effect associated with full-time underemployment for all males is still evident, although only for Specification (A) is the effect significant at the 10 per cent level. Similarly, the significant negative effect of part-time underemployment evident

²³ As with the life satisfaction variable, ordered probit models of job satisfaction were also estimated in place of OLS regression, but are not reported because inferences were not significantly different, and OLS estimates are much more easily interpreted.

for all females is also evident for employed females, and (unlike males) is robust to the inclusion of the employment variables (Specification (B)).

2. *Wage rate*: No significant effects of underemployment are evident for males or females.
3. *Job satisfaction*: For both males and females, part-time underemployment is associated with lower job satisfaction. Full-time underemployment has no significant effect, although the point estimate is (a smaller) negative.

7. Factors Associated with Underemployment – Model Estimation

Identification of the predictors of underemployment – more specifically, the characteristics associated with a higher probability of underemployment – is potentially valuable for the targeting of policies to assist those affected. In the absence of a compelling case for any one approach, and with all potential approaches having limitations, a multi-pronged approach is taken.

Initially, the focus is on employed persons only, and on predictors of the *occurrence* of underemployment, rather than its *extent*. This approach delivers information on the factors associated with underemployment, given a person is employed. It allows estimation of binary outcome models, estimates from which are relatively easily interpreted. Restricting to employed persons also permits us to investigate the effects of characteristics that are only observed for employed persons, such as occupation and industry of employment. Furthermore, the approach is consistent with previous research in Australia, including Wooden (1993) and Doiron (2003), facilitating comparisons of findings from the HILDA survey data with evidence from other data sources.²⁴

The restriction to employed persons precludes investigation of how the factors associated with underemployment compare with those associated with unemployment. For this reason, analysis is also undertaken on all persons in the labour force, with a view to comparing predictors of underemployment with the predictors of unemployment. Among the alternative approaches potentially suited to examination of this issue, estimation of multinomial logit models was viewed as most appropriate. This allows flexibility in terms of the nature of the effects of characteristics on outcomes when compared with alternatives such as ordered probit. However, it is necessary to invoke the ‘Independence of Irrelevant Alternatives’ (IIA) assumption. This requires the probability of one outcome relative to another to be insensitive to the existence of another possible outcome.²⁵ Compared with the probit analysis of employed persons, it is also

²⁴ Wooden (1993) estimates probit models of the probability of being underemployed on all employed persons and on part-time employed persons only. Doiron (2003) takes a slightly different approach, estimating ordered probit models of the difference between desired and actual hours, identifying three separate states: underemployed, fully employed and overemployed. Although Doiron models overemployment, her approach is similar to the current study in that the *magnitude* of the difference between preferred and actual working hours is not modelled. (The argument for ordered probit over multinomial logit is that the latent variable is the difference between desired and actual hours, which is ordered. However, the validity of this approach critically depends on believing the underlying model is correct. For example, in contrast to the multinomial logit model, the ordered probit model cannot allow specific characteristics to increase both underemployment and overemployment.)

²⁵ Tests for the validity of the IIA assumption exist (and are reported in this study), but in fact provide little guidance to violation of the assumption. In practice, the validity of the IIA assumption depends on modelling outcomes that are sufficiently distinct from each other. Note that an implication of the IIA assumption is that tests of sensitivity of results to the inclusion of persons not in the labour are redundant. See Greene (2000, pp 864-65) and Long and Freese (2001) for further discussion of the IIA assumption.

somewhat more difficult to interpret estimation results, and we cannot examine the impact of characteristics that are only observed for the employed.²⁶

The above-mentioned probit and logit models consider the factors affecting the *likelihood* of an individual being underemployed, but do not consider the issue of the extent of underemployment. To this end, two further approaches are taken. First, multinomial logit models are estimated which distinguish between two levels of underemployment. This allows examination of whether the factors associated with underemployment differ for the ‘mildly underemployed’ (defined as desiring fewer than 10 additional hours of work per week) from the ‘very underemployed’ (desiring 10 or more additional hours). Second, an approach that attempts to identify the determinants of the extent of underemployment is taken, by estimating OLS models of the extent of underemployment on samples comprising the underemployed.²⁷

For all of the models estimated, two alternative definitions of underemployment are used:

1. When desired hours of any employed person exceeds usual actual hours.
2. When desired hours of a part-time employed person exceeds usual actual hours.

²⁶ Alternative possibilities to the multinomial logit approach were considered, but rejected on the basis that they deliver no new information or impose additional unnecessary assumptions. These include:

- Estimate probit models of the probability of being unemployed versus fully employed, on a sample comprising only the unemployed and fully employed, for comparison with estimates from models of the probability of being underemployed versus fully employed. This approach creates a control group – the fully employed – that is the same for is for both sets of equations. However, such independent probit models provide no more information than provided by multinomial logit models, and appear to impose stronger assumptions than required for multinomial logit.
- Estimate probit models on the underemployed and unemployed only, to investigate whether significant differences between the two groups exist. Again, however, this delivers nothing that a multinomial logit model estimated over all persons in the labour force could not.
- Estimate probit models of the probability of employment for those in the labour force, and then use the inverse Mill’s ratio as a regressor in probit models of the probability of underemployment estimated over the employed (corrected for selection into the employed sample). Probit models can then also be estimated over all persons in the labour force of the probability of being underemployed or unemployed (grouped together) to see if estimates are similar to those for the probability of being underemployed (corrected for sample selection). However, this again does not seem to achieve anything additional to the multinomial logit, and creates new problems (such as the need for instruments).
- Estimate ordered probit models, where the ordering is: unemployed, underemployed (possibly disaggregated further by extent of underemployment) and fully employed. However, such models impose restrictions that do not seem justified in the current context. Specifically, a single index explaining unemployment and underemployment doesn’t seem appropriate, and is in part assuming what is of interest.

²⁷ The estimation of a model of the extent of underemployment raises the issue of why such a model is not simply estimated over all persons. That is, desired and actual hours are available for all persons (or at least all persons in the labour force), so it is possible to estimate a model of the gap between desired and actual hours over all persons. However, as noted in Section 4, this would entail a broadening of the scope of the study, which is in fact likely to obscure findings on the issue of underemployment. For example, if no single (linear) function explains both underemployment and overemployment, estimates for males are likely to be driven by the overemployed (who are more common than the underemployed for males); and even for the overemployed, inferences would be invalid because of the impact of the underemployed. Such an approach also does not permit us to implement a measure of underemployment consistent with the ILO (1998) definition of underemployment. Another alternative approach is to estimate a model of the extent of underemployment over a sample that includes the fully employed, with such persons assigned a value for the underemployment variable of zero. However, the effective truncation of the underemployment variable at zero for a large number of observations will cause OLS estimates to be downward-biased and techniques for overcoming this bias are unlikely to be satisfactory in the current context. (For example, Cragg’s (1971) two-stage truncated Tobit method assumes a latent unobserved variable that is normally distributed, which we know to be false for the underemployment variable, since the observed actual distribution has a large spike at zero.)

The first definition corresponds to a general definition of underemployment that does not condition underemployment status of employed persons on the number of hours worked. It includes both part-time and full-time workers who would like to work more hours. Including the full-time underemployed is preferable from the perspective that underemployment occurs whenever an employed person wants more hours, irrespective of current hours. However, the second definition is also implemented because it more closely corresponds with the ILO (1998) definition and definitions used by previous research.

For the OLS models of the extent of underemployment estimated on the underemployed, the dependent variables which correspond to the above to the above two definitions are:

1. Desired hours minus usual actual hours of all employed persons for whom this is positive.
2. Desired hours minus usual actual hours of part-time employed persons, where desired hours are set equal to 35 for those with desired hours exceeding 35.

The effects on underemployment of a wide range of characteristics are examined, based on judgements of factors that could potentially be relevant to underemployment status. These include socio-demographic characteristics, health, local labour market conditions, employment history and, for the employed, employment characteristics. They are for the most part consistent with the characteristics that have been examined in other labour market studies, for example of unemployment and wages (e.g. Brooks and Volker (1985), Preston (1997)). Specifically, for all specifications estimated, variables (details of which are provided in Appendix A) are employed for:²⁸

- Socio-demographic characteristics:
 - Age (5 dummy variables)
 - Educational attainment (4 dummy variables)
 - Region of residence (dummy variable for whether reside in a major city)²⁹
 - Income unit type (4 dummy variables)
 - Number of dependent children (number aged less than 15 years; number aged 15-24 years)
 - Indigenous status (dummy variable)
 - Immigrant status (2 dummy variables)
 - Length of residency in Australia of immigrants (quadratic, interacted with immigrant dummies)
 - English proficiency (dummy variable)
- Health (dummy variable)

²⁸ Also considered for inclusion were variables for receipt of income support payments by the income unit, housing tenure type, enrolment at an educational institution, being employed part-time and being employed on a casual basis. These were not used, however, on the basis that they are potentially affected by underemployment status (or, more to the point, there is some unobserved third factor that affects both underemployment and the other variable, causing biased and inconsistent coefficient estimates if that variable is included in the estimating equation). [In practice, only the coefficient estimates for the variables for income support receipt and type of employment were statistically significant and had an impact on other coefficient estimates.]

²⁹ Specifications with dummies for state of residence were also estimated, but are not reported because state of residence was found to have little impact.

- Local labour market conditions (local unemployment rate)
- Employment history:
 - Proportion of working-age life not employed
 - Proportion of working-age life unemployed
 - Proportion of preceding (1999-2000) financial year not employed
 - Proportion of preceding (1999-2000) financial year unemployed
 - Number of jobs in preceding (1999-2000) financial year

For models estimated over employed persons only, specifications are also estimated which include variables for:

- Tenure with current employer
- Industry of main job (16 dummy variables)
- Occupation of main job (9 dummy variables)
- Trade union membership (dummy variable)
- Self employment status (dummy variable)

The local unemployment rate is included to attempt to capture the effects of the labour demand conditions facing the individual. All other variables essentially reflect labour supply factors, in terms of the nature (productivity) of the labour supplied, or labour supply behaviour (preferences). The inclusion of variables for employment history is relatively novel for labour market studies using Australian data, and reflects the comparative richness of the HILDA data. These variables can be interpreted as capturing unobserved characteristics likely to affect labour market outcomes, including unobserved human capital, although they may also potentially capture ‘stigma’ or ‘scarring’ effects associated with past unemployment or non-participation in the labour force.

7.1. Underemployment among employed persons

All employed persons

Probit models are estimated of the probability of underemployment, given a person is employed. As for the probit models estimated in Section 6, mean marginal effects are reported rather than the coefficient estimates. Table 7.1 contains estimates for two specifications, for each of the definitions of underemployment, and for males and females separately (eight specifications in all). The baseline specification (1) contains variables for age, educational attainment, region of residence, disability, family type and composition, indigenous status, country of birth, length of residency in Australia (for immigrants), English proficiency, the unemployment rate in the local region and recent and lifetime employment history. Specification (2) adds variables for characteristics observed only for employed persons – employment tenure, industry, occupation, trade union membership and self-employment status.³⁰

³⁰ A range of other specifications were estimated, for the probit models and also the multinomial logit models estimated on persons in the labour force, to examine the sensitivity of estimates to the inclusion and exclusion of variables. No large effects on inferences were evident. Perhaps surprisingly, even the inclusion/exclusion of

Results for males

The baseline specification for males, where full-time workers can be underemployed, shows that a number of characteristics appear to be important to the likelihood of underemployment, including age, educational attainment, income unit type, number of dependent children, indigenous status, country of birth, local unemployment rate and employment history. To provide an example of interpretation of the reported estimates, the mean effect of changing the dummy variable ‘aged 25-34’ from zero to one, evaluated over all employed males in the sample, is to decrease the predicted probability of underemployment by 0.05.

The signs of most mean marginal effects are consistent with intuition. A characterisation of the results is that employed males who are younger, less educated, single, either Aboriginal or an NESB immigrant and who live in high unemployment regions, are more likely to be underemployed. These are characteristics also associated with higher rates of unemployment (e.g. Brooks and Volker, 1985). Furthermore, those who have a history of unemployment since the age of 15 and who did not work much in the preceding year, but nonetheless had a large number of jobs over that year, are also more likely to be underemployed. That a history of unemployment is a predictor of underemployment suggests the underemployed have a more tenuous foothold in the labour market than the fully employed.³¹ The fact that a higher number of jobs in the previous financial year is associated with a higher underemployment probability is also consistent with the underemployed having a less secure position in the labour market, or perhaps having difficulty finding a good employment match.

Less easily explained is that, while there is no significant effect associated with the number of dependent children aged less than 15 years, the mean marginal effect is increasing in the number of dependent children aged 15-24 years. The mean effect of each additional dependent child aged 15-24 years is to increase the probability of underemployment by 0.036. This may reflect either increased costs or reduced caring needs of older children.

With respect to employment history, as noted, a higher rate of lifetime unemployment has a positive effect on the probability of underemployment, but there is no (additional) adverse effect associated with recent unemployment experience (within the previous financial year). The reverse is true with respect to non-employment: a higher rate of lifetime non-employment does not significantly affect chances of underemployment, but non-employment in the preceding financial year does have an adverse effect. The inference is that a long-term history of unemployment, reflecting long-term difficulty retaining employment, is associated with a higher probability of underemployment, whereas a long-term history of non-participation in the labour force does not impact on the likelihood of underemployment. In the short-term, however, non-employment, whether due to non-participation in the labour force or unemployment, makes underemployment more likely. This possibly reflects the difficulties workers face following non-employment in (re-)establishing themselves in the labour market and finding a good job.

The addition of employment variables (specification (2)) tends to slightly decrease the magnitude of estimated marginal effects of the existing variables, but does not alter the sign or statistical significance of most estimates. Of the added variables, only a few exert a significant effect on the probability of underemployment. Increased employment tenure is associated with a decreased probability of underemployment, which may be capturing effects of a good worker-

employment history variables did not have a large impact on other coefficient estimates. Interactions between the age and education dummies were also implemented, but all estimates on these interaction terms were statistically insignificant and so they were dropped.

³¹ Marginal effects estimates for employment history variables are not as small as they might appear at first glance. For example, if the proportion of the previous year not employed increases from zero to half, the baseline model mean marginal effect estimate implies the probability of underemployment increases by 0.07

firm match. The ‘accommodation, cafes and restaurants’ industry is associated with an increased probability of underemployment, which may reflect a high incidence of part-time and casual employment in this industry, or seasonal effects associated with the time of the year of the survey. The third type of significant effect of employment variables is that lower-skill occupations are associated with a higher probability of underemployment. Being in the occupational category ‘managers and administrators’, ‘professionals’, ‘associate professionals’ or ‘advanced clerical’ decreases the probability of underemployment by between 0.07 and 0.12 compared with being in the ‘labourers and related’ occupation (although the effect for ‘advanced clerical’ is only significant at the 8 per cent level).

Restricting underemployment to part-time workers, estimates may differ not only because the determinants of part-time worker underemployment may differ from the determinants of full-time worker underemployment, but also because estimates are more likely to reflect the determinants of part-time employment status (since part-time employment is a precondition for underemployment).

In broad terms, however, mean marginal effects are somewhat similar for the restricted definition. This is to some extent surprising, given the differences between part-time and full-time workers and the high incidence of underemployment among full-time employed males (who are no longer treated as underemployed under the restricted definition). The main differences are that the adverse effects associated with being aged 15-24 are reduced, and long-term non-employment history takes over from long-term unemployment history as a significant predictor of underemployment status. Trade union membership and self employment also acquire significant average effects on the probability of underemployment, of -0.03 and 0.05 respectively.

Results for females

Allowing full-time workers to be underemployed, results for females are similar to males for age, educational attainment, income unit type and country-of-birth effects. Differences arise with respect to variables for number of dependent children, indigenous status, English proficiency, length of residency in Australia for NESB immigrants, local unemployment rate and employment history. The probability of underemployment is increasing in the number of dependent children aged less than 15, in contrast to males, for whom it is the number aged 15-24 that matters. This effect is likely to reflect parenting responsibilities for younger children, which are perhaps more likely to be borne by females than males. It may also in part simply reflect the relative high incidence of part-time employment among females with dependent children under 15 years of age. There is a negative mean effect of approximately -0.08 associated with a lack of proficiency in English, the reasons for which are not clear. As with males, NESB immigrants have a higher probability of underemployment, but, in contrast to males, increased length of time resident in Australia diminishes this effect for females.

Point estimates of the effects of employment history of females are broadly similar to those of males. However, there are differences in terms of which variables are statistically significant: the effect of ‘number of jobs in the preceding financial year’ is not statistically significant for females, but the effects are significant for *all four* variables for non-employment and unemployment history. Two variables with significant marginal effects for males do not have significant effects for females: indigenous status and the local unemployment rate. The absence of an effect for the latter implies labour demand conditions are not a factor in underemployment among employed females, which represents an important difference to males.

Most female underemployment is among part-time workers (see Table 5.3), so estimates would be expected to be relatively insensitive to the definition of underemployment adopted. However, this is not entirely the case. The significant positive effect on the probability of underemployment associated with being single disappears for those without dependent children

(it remains for sole parents compared with couples). A negative effect of being an ESB immigrant also arises, which is diminishing in length of residency in Australia. The years-since-migration effect may derive from differences across ESB immigrant arrival cohorts (with more recent arrivals less likely to be part-time workers who are underemployed).

Table 7.1: Probit estimates of mean marginal effects on the probability of underemployment – Employed males

	Full-time workers can be underemployed				Only part-time workers can be underemployed			
	(1)		(2)		(1)		(2)	
	MME	SE	MME	SE	MME	SE	MME	SE
Aged 25-34	-0.050	0.015*	-0.025	0.016	-0.058	0.008*	-0.044	0.009*
Aged 35-44	-0.087	0.015*	-0.053	0.016*	-0.060	0.009*	-0.041	0.010*
Aged 45-54	-0.117	0.013*	-0.075	0.016*	-0.063	0.008*	-0.041	0.010*
Aged 55-64	-0.098	0.015*	-0.055	0.020*	-0.028	0.011*	-0.005	0.015
Degree	-0.071	0.014*	-0.046	0.018*	-0.037	0.009*	-0.023	0.012
Other P-S	-0.015	0.013	0.001	0.014	-0.025	0.009*	-0.016	0.009
Comp H-S	-0.010	0.017	-0.007	0.017	0.014	0.012	0.011	0.011
City	0.006	0.012	0.002	0.012	0.003	0.008	-0.001	0.008
Disabled	0.035	0.021	0.028	0.020	0.034	0.015*	0.022	0.014
Couple	-0.059	0.013*	-0.054	0.013*	-0.029	0.009*	-0.025	0.009*
Sole parent	-0.026	0.034	-0.034	0.032	0.006	0.026	-0.005	0.021
Couple parents	-0.064	0.020*	-0.060	0.020*	-0.022	0.014	-0.020	0.013
No. dep <15	0.002	0.008	0.006	0.008	0.000	0.006	0.002	0.005
No. dep 15-24	0.036	0.014*	0.029	0.014*	0.037	0.009*	0.028	0.008*
ATSI	0.127	0.060*	0.100	0.055	0.064	0.041	0.041	0.034
ESB Immigrant	-0.011	0.044	-0.025	0.041	-0.046	0.024	-0.051	0.022*
NESB Immigrant	0.173	0.049*	0.125	0.045*	0.043	0.033	0.016	0.026
Poor English	0.052	0.061	0.064	0.061	-0.024	0.031	-0.007	0.037
YSM	-0.001	0.004	0.000	0.004	0.006	0.004	0.006	0.004
YSM2	0.000	0.001	0.000	0.001	-0.001	0.001	-0.001	0.001
YSM-NESB	-0.004	0.006	-0.004	0.006	-0.007	0.005	-0.006	0.004
YSM2-NESB	0.000	0.001	0.000	0.001	0.001	0.001	0.001	0.001
Region unemp	0.007	0.003*	0.006	0.003*	0.005	0.002*	0.004	0.002*
Not emp - life	4.57E-04	5.31E-04	1.07E-04	5.23E-04	1.04E-03	3.37E-04*	7.61E-04	3.21E-04*
Unemp - life	1.85E-03	8.67E-04*	1.34E-03	8.54E-04	4.33E-04	5.36E-04	4.07E-04	5.10E-04
Not emp - year	1.30E-03	4.54E-04*	9.03E-04	4.46E-04*	5.74E-04	2.89E-04*	2.89E-04	2.74E-04
Unemp - year	1.03E-03	6.15E-04	6.84E-04	6.03E-04	8.34E-04	3.69E-04*	6.18E-04	3.47E-04
No. jobs - year	0.027	0.009*	0.017	0.009	0.026	0.005*	0.018	0.005*
Tenure			-0.004	0.001*			-0.003	0.001*
Indaccom			0.080	0.040*			0.122	0.040*
Indcommun			0.029	0.043			0.002	0.030
Indconstr			0.002	0.028			0.030	0.023
Indcultrec			0.016	0.039			0.071	0.037
Indeduc			0.078	0.044			0.154	0.049*
Indelec			-0.037	0.049			-0.011	0.043

Note: MME: Mean Marginal Effect. SE: Standard error. * indicates significance at the 5% level.

Table 7.1 continued: Probit estimates of mean marginal effects on the probability of underemployment – Employed males

	Full-time workers can be underemployed				Only part-time workers can be underemployed			
	(1)		(2)		(1)		(2)	
	MME	SE	MME	SE	MME	SE	MME	SE
Indfinance			-0.025	0.042			0.007	0.039
Indgovdef			0.029	0.039			0.024	0.033
Indhlthes			0.060	0.043			0.127	0.045*
Indmanuf			-0.003	0.027			-0.018	0.017
Indmining			-0.019	0.041			-0.035	0.028
Indperserv			0.072	0.044			0.045	0.034
Indpropbus			0.042	0.033			0.048	0.027
Indrtrade			-0.014	0.027			0.018	0.021
Indtrans			0.001	0.032			0.029	0.027
Indwstrade			0.011	0.034			-0.020	0.021
Occmgr			-0.116	0.014*			-0.059	0.008*
Occprof			-0.073	0.018*			-0.060	0.010*
Occasprof			-0.097	0.015*			-0.056	0.008*
Occadvclerk			-0.077	0.044			-0.026	0.030
Occintclerk			-0.040	0.019*			-0.009	0.012
Occelemclerk			0.054	0.028			0.028	0.017
Octrade			-0.039	0.017*			-0.040	0.009*
Occintprod			-0.019	0.019			-0.014	0.012
Union			-0.003	0.012			-0.027	0.008*
Self employed			0.011	0.015			0.054	0.013*
Pseudo R-squared	0.106		0.143		0.166		0.261	
Sample size	4426		4425		4426		4425	

Note: MME: Mean Marginal Effect. SE: Standard error. * indicates significance at the 5% level.

Table 7.1 continued: Probit estimates of mean marginal effects on the probability of underemployment – Employed females

	Full-time workers can be underemployed				Only part-time workers can be underemployed			
	(1)		(2)		(1)		(2)	
	MME	SE	MME	SE	MME	SE	MME	SE
Aged 25-34	-0.093	0.016*	-0.056	0.017*	-0.088	0.014*	-0.051	0.016*
Aged 35-44	-0.086	0.017*	-0.040	0.019*	-0.085	0.015*	-0.038	0.018*
Aged 45-54	-0.128	0.015*	-0.077	0.018*	-0.105	0.014*	-0.053	0.018*
Aged 55-64	-0.126	0.015*	-0.080	0.022*	-0.096	0.015*	-0.049	0.022*
Degree	-0.083	0.015*	-0.021	0.020	-0.064	0.014*	-0.003	0.019
Other P-S	-0.041	0.014*	-0.016	0.015	-0.042	0.013*	-0.020	0.014
Comp H-S	-0.032	0.017	-0.019	0.018	-0.030	0.016	-0.016	0.017
City	0.006	0.013	0.011	0.013	-0.002	0.012	0.004	0.012
Disabled	0.027	0.025	0.028	0.024	0.041	0.024	0.040	0.023
Couple	-0.049	0.016*	-0.043	0.016*	-0.023	0.016	-0.017	0.016
Sole parent	0.039	0.031	0.016	0.028	0.094	0.034*	0.067	0.031*
Couple parents	-0.062	0.024*	-0.070	0.023*	-0.003	0.023	-0.012	0.022
No. dep <15	0.025	0.009*	0.028	0.009*	0.024	0.009*	0.026	0.008*
No. dep 15-24	0.011	0.014	0.009	0.014	0.002	0.013	-0.002	0.013
ATSI	-0.009	0.043	-0.006	0.043	-0.011	0.039	-0.008	0.040
ESB Immigrant	-0.066	0.047	-0.068	0.046	-0.107	0.036*	-0.105	0.036*
NESB Immigrant	0.208	0.057*	0.146	0.052*	0.166	0.056*	0.108	0.050*
Poor English	-0.083	0.045	-0.097	0.040*	-0.074	0.041	-0.082	0.038*
YSM	0.008	0.005	0.009	0.005	0.015	0.006*	0.014	0.006*
YSM2	-0.001	0.001	-0.002	0.001	-0.003	0.001*	-0.003	0.001*
YSM-NESB	-0.018	0.007*	-0.016	0.007*	-0.024	0.007*	-0.021	0.007*
YSM2-NESB	0.003	0.001*	0.003	0.001*	0.004	0.001*	0.004	0.001*
Region unemp	0.004	0.003	0.003	0.003	0.006	0.003	0.004	0.003
Not emp - life	6.89E-04	3.13E-04*	2.69E-04	3.16E-04	7.21E-04	2.88E-04*	3.10E-04	2.90E-04
Unemp - life	3.39E-03	9.63E-04*	3.07E-03	9.49E-04*	3.62E-03	8.75E-04*	3.24E-03	8.57E-04*
Not emp - year	8.13E-04	3.28E-04*	3.55E-04	3.31E-04	6.63E-04	3.01E-04*	2.33E-04	3.01E-04
Unemp - year	1.33E-03	5.84E-04*	1.17E-03	5.77E-04*	1.45E-03	5.28E-04*	1.29E-03	5.18E-04*
No. jobs - year	0.015	0.009	0.005	0.009	0.011	0.009	0.002	0.008
Tenure			-0.005	0.001*			-0.005	0.001*
Indaccom			0.084	0.051			0.061	0.046
Indcommun			0.022	0.062			-0.042	0.045
Indconstr			-0.008	0.056			-0.003	0.051
Indcultrec			0.041	0.055			0.049	0.052
Indeduc			0.075	0.049			0.071	0.045
Infinance			-0.051	0.041			-0.059	0.034

Note: MME: Mean Marginal Effect. SE: Standard error. * indicates significance at the 5% level.

Table 7.1 continued: Probit estimates of mean marginal effects on the probability of underemployment – Employed females

	Full-time workers can be underemployed				Only part-time workers can be underemployed			
	(1)		(2)		(1)		(2)	
	MME	SE	MME	SE	MME	SE	MME	SE
Indgovdef			-0.048	0.044			-0.068	0.034*
Indhlthcs			0.037	0.043			0.041	0.039
Indmanuf			-0.032	0.039			-0.049	0.032
Indperserv			0.050	0.053			0.038	0.048
Indpropbus			0.033	0.044			0.004	0.037
Indrtrade			0.018	0.042			0.008	0.037
Indtrans			0.031	0.057			-0.019	0.044
Indwstrade			-0.029	0.045			-0.053	0.036
Occmgr			-0.161	0.013*			-0.137	0.012*
Occprof			-0.133	0.021*			-0.124	0.019*
Occasprof			-0.128	0.016*			-0.118	0.014*
Occadvclerk			-0.097	0.021*			-0.077	0.020*
Occintclerk			-0.069	0.020*			-0.064	0.018*
Occelemclerk			-0.006	0.025			0.012	0.025
Octrade			-0.060	0.028*			-0.063	0.024*
Occintprod			-0.002	0.038			-0.008	0.035
Union			-0.012	0.014			-0.015	0.013
Self employed			0.007	0.020			0.024	0.020
Pseudo R-squared	0.077		0.122		0.081		0.136	
Sample size	3930		3907		3930		3907	

Note: MME: Mean Marginal Effect. SE: Standard error. * indicates significance at the 5% level. Omitted industry variables (*Indelec* and *Indmining*) reflect the absence of variation in the dependent variable for persons in those industries. Persons working in these industries were excluded from the sample. Sample sizes are smaller for specification (2) for this reason and because of missing values for other employment variables.

Part-time employed persons

A concern that arises with estimation of underemployment models over all employed persons is that results can to a significant extent be driven by part-time employment status. This is especially the case for the definition in which only the part-time workers can be underemployed, since under this definition a precondition for underemployment is that a person be employed part-time. Coefficient estimates may therefore be reflecting the factors determining part-time employment status, rather than the factors determining underemployment status. Although the problem of sample selection bias arises with a restriction to part-time workers (we observe full-time workers who become part-time because they become underemployed, but do not observe full-time workers who do *not* become part-time employed due to underemployment), it is nonetheless important to examine the sensitivity of estimates to the restriction to part-time workers.³²

³² An alternative is to include controls for part-time employment status in the probit models estimated over all employed persons, but a similar problem arises, which is that part-time employment status is endogenous with respect to underemployment status.

Table 7.2: Probit estimates of mean marginal effects on the probability of underemployment – Part-time employed persons

	Males				Females			
	(1)		(2)		(1)		(2)	
	MME	SE	MME	SE	MME	SE	MME	SE
Aged 25-34	0.028	0.066	-0.019	0.065	-0.045	0.036	-0.011	0.038
Aged 35-44	0.029	0.069	-0.014	0.070	-0.046	0.035	6.42E-04	0.038
Aged 45-54	-0.038	0.068	-0.069	0.070	-0.141	0.031*	-0.084	0.036*
Aged 55-64	-0.136	0.070	-0.136	0.074	-0.206	0.030*	-0.142	0.040*
Degree	-0.097	0.064	-0.076	0.070	-0.054	0.028	-0.002	0.036
Other P-S	0.004	0.051	-0.027	0.052	-0.027	0.025	-0.016	0.026
Comp H-S	0.033	0.053	0.030	0.052	-0.063	0.030*	-0.050	0.031
City	-0.052	0.043	-0.050	0.043	-0.005	0.022	-0.004	0.023
Disabled	-0.026	0.059	-0.028	0.058	0.022	0.038	0.029	0.039
Couple	-0.147	0.058*	-0.139	0.058*	-0.106	0.031*	-0.100	0.031*
Sole parent	-0.157	0.088	-0.140	0.088	-0.058	0.043	-0.064	0.042
Couple parents	-0.145	0.065*	-0.148	0.064*	-0.236	0.041*	-0.228	0.041*
No. dep <15	0.016	0.025	0.020	0.025	0.018	0.015	0.022	0.015
No. dep 15-24	0.024	0.043	0.032	0.042	0.012	0.023	0.006	0.023
ATSI	0.254	0.121*	0.229	0.124	-0.021	0.070	-0.036	0.068
ESB Immigrant	-0.075	0.214	-0.127	0.207	-0.151	0.092	-0.139	0.096
NESB Immigrant	-0.047	0.114	-0.046	0.113	0.249	0.086*	0.192	0.086*
Poor English	-0.087	0.208	-0.058	0.200	-0.052	0.127	-0.064	0.126
YSM	0.011	0.023	0.012	0.023	0.022	0.011	0.021	0.011
YSM2	-0.003	0.005	-0.003	0.005	-0.004	0.002	-0.004	0.002
YSM-NESB	0.002	0.027	-0.002	0.027	-0.033	0.013*	-0.029	0.013*
YSM2-NESB	-4.84E-04	0.006	-9.56E-06	0.006	0.006	0.003*	0.005	0.003*
Region unemp	0.006	0.010	0.006	0.010	0.009	0.005	0.007	0.005
Not emp - life	3.57E-04	1.46E-03	4.59E-04	1.44E-03	1.38E-04	5.17E-04	-2.72E-04	5.32E-04
Unemp - life	6.63E-03	3.12E-03*	7.53E-03	3.08E-03*	4.77E-03	1.55E-03*	4.23E-03	1.54E-03*
Not emp - year	-9.01E-05	1.16E-03	-5.84E-04	1.18E-03	2.60E-04	5.11E-04	-4.01E-04	5.21E-04
Unemp - year	3.76E-03	1.56E-03*	3.44E-03	1.56E-03*	2.45E-03	9.35E-04*	2.43E-03	9.28E-04*
No. jobs - year	0.060	0.027*	0.053	0.027*	0.001	0.016	-0.009	0.016
Tenure			-0.004	0.003			-0.008	0.002*
Indaccom			-0.049	0.107			0.002	0.070
Indcommun			-0.143	0.148			-0.026	0.103
Indconstr			0.081	0.116			-0.054	0.085

Note: MME: Mean Marginal Effect. SE: Standard error. * indicates significance at the 5% level.

Table 7.2 continued: Probit estimates of mean marginal effects on the probability of underemployment – Part-time employed persons

	Males				Females			
	(1)		(2)		(1)		(2)	
	MME	SE	MME	SE	MME	SE	MME	SE
Indcultrec			-0.142	0.110			-0.029	0.076
Indeduc			0.009	0.126			0.059	0.073
Indfinance			0.117	0.228			-0.090	0.075
Indgovdef			-0.023	0.172			-0.024	0.100
Indhlthcs			-0.032	0.123			-0.001	0.067
Indmanuf			-0.136	0.107			0.011	0.079
Indmining			8.18E-04	0.271			-	-
Indperserv			-0.106	0.121			0.092	0.089
Indpropbus			0.038	0.114			0.011	0.070
Indrtrade			-0.208	0.095*			-0.017	0.065
Indtrans			0.051	0.126			-0.022	0.090
Indwstrade			-0.082	0.150			-0.076	0.078
Occmgr			-0.128	0.110			-0.175	0.057*
Occprof			-0.114	0.079			-0.134	0.040*
Occasprof			6.70E-04	0.095			-0.109	0.042*
Occadvclerk			-0.205	0.157			-0.080	0.048
Occintclerk			0.144	0.067*			-0.066	0.036
Occelemclerk			0.115	0.061			-0.017	0.041
Octrade			0.079	0.068			-0.045	0.063
Occintprod			-0.010	0.067			0.047	0.074
Union			-0.052	0.050			0.015	0.026
Self employed			0.023	0.055			-6.91E-04	0.034
Pseudo R-squared	0.082		0.128		0.077		0.101	
Sample size	696		695		1929		1925	

Note: MME: Mean Marginal Effect. SE: Standard error. * indicates significance at the 5% level. Omitted industry variables (*Indelec* for males, and *Indmining* and *Indelec* for females) reflect the absence of variation in the dependent variable for persons in those industries. Persons working in these industries were excluded from the sample.

Table 7.2 reports mean marginal effects for probit models of underemployment estimated over part-time employed persons only. The overriding impression is that marginal effects are, if anything, more pronounced (although smaller sample sizes have tended to decrease the precision of the estimates). Especially notable in this regard is that a large positive effect on the probability of underemployment associated with being single (and without dependent children) arises, compared with only a small (insignificant) positive effect when the sample comprises all employed persons. A possible implication is that the relatively higher estimated probability of underemployment for couples and sole parents evident in Table 7.1 reflects a greater tendency among these groups to prefer part-time employment.

An exception to the generalisation that effects are more pronounced in Table 7.2 than in Table 7.1 is that age effects essentially disappear for males, and are restricted to negative effects associated with being aged 45-64 years for females. Adverse effects of NESB immigrant status also disappear for males in Table 7.2.

7.2. Persons in the labour force

Multinomial logit models

Multinomial logit models are used to model the probability of unemployment, underemployment, and full employment of persons in the labour force. The multinomial logit model is identified by normalising the parameters β to zero for one outcome (the base category), and is described by the system of equations:

$$\Pr(y = 1) = \frac{1}{1 + \sum_{j=2}^J e^{x\beta_j}}$$

$$\Pr(y = i) = \frac{e^{x\beta_i}}{1 + \sum_{j=2}^J e^{x\beta_j}}, \quad i = 2, \dots, J \quad (7.1)$$

where $y = 1$ is the base category.

Multinomial logit models involve estimation of more than one equation, and it is difficult to interpret individual coefficients. Marginal effects are, as with probit models, more informative. For multinomial logit models, the marginal effect of explanatory variable x_k on the probability outcome i occurs is given by:

$$\frac{\partial \Pr(y = i | x)}{\partial x_k} = \Pr(y = i | x) \left[\beta_{k,i|J} - \sum_{j=1}^J \beta_{k,j|J} \Pr(y = j | x) \right] \quad (7.2)$$

As is the case with probit models, marginal effects depend on the values of the explanatory variables at which they are evaluated. Mean marginal effects are therefore reported. Thus, for continuous variables, the mean marginal effect of a variable is obtained by evaluating equation (7.2) for each individual, holding constant other variables at actual values, and taking the mean effect over all individuals in the sample. Similarly, for binary explanatory variables, the effect of a discrete change from zero to one, holding constant all other variables at actual values, is evaluated for each individual in the sample, and the mean effect calculated.

Analytic standard errors for the mean marginal effects derived from multinomial logit equations are not available. Standard errors derived from bootstrap samples are therefore reported. Specifically, 2000 samples are generated by sampling with replacement from the original sample (with each bootstrap sample containing the same number of observations as the original sample). Following Biewen (2002), the standard error of any estimate M is then calculated as:

$$SE_M = \sqrt{\left(\frac{1}{B-1} \sum_{i=1}^B \hat{M}^i - \left(\frac{1}{B} \sum_{i=1}^B \hat{M}^i \right) \right)^2} \quad (7.3)$$

where B is the number of bootstrap samples (2000) and \hat{M}^i is the value of M in the i th bootstrap sample.

Two sets of tests are conducted for all of the multinomial logit models estimated in this study. The first set comprises two commonly employed tests of the IIA assumption, the Hausman test and the Small-Hsiao test. Both of these tests involve estimation of restricted models in which one or more of the outcome categories (and observations in those categories) are eliminated. Coefficient estimates from the restricted models are then compared with coefficient estimates from the full model, with large differences between the estimates implying violation of the IIA

assumption. The Hausman and Small-Hsiao test statistics are both distributed chi-squared, large values implying violation of the IIA assumption. These test statistics are reported for all models.³³

The second set of tests concerns whether the determinants of any two outcomes are similar, to the point that the outcomes can be regarded as indistinguishable. That is, if none of the independent variables significantly affect the odds of outcome m versus n , the two outcomes can be combined, resulting in more efficient estimates, with no loss of information. This amounts to a test of the hypothesis:

$$H_0 : \beta_{1,m|n} = \beta_{2,m|n} = \dots = \beta_{K,m|n} = 0 \quad (7.4)$$

where $\beta_{i,m|n}$ is the coefficient estimate of explanatory variable i for outcome m when the base outcome category is n . For example, outcome m might be underemployment and outcome n might be unemployment. Both likelihood ratio (LR) and Wald tests can be used to test (7.4). The LR test of combining m and n involves estimating the unrestricted model and then a restricted model with base outcome m and with coefficient estimates for outcome n constrained to 0 (with the exception of the constant). The difference in the estimated log likelihood of the two models is distributed chi-squared with K degrees of freedom. The Wald test requires estimation of the unrestricted model only. It involves comparing the coefficient estimates for outcomes m and n , and the Wald statistic is also distributed chi-squared with K degrees of freedom.

Wald and LR tests for combining outcomes were conducted for all outcome combinations of all multinomial logit models. The results of the Wald and LR tests are not reported individually for each logit model, however, since the null hypothesis that two outcomes can be combined was rejected at the 1 per cent level for all outcome combinations in all equations.

Table 7.3 reports mean marginal effects for multinomial logit models for the three-outcome case – that is, where persons in the labour force can be unemployed, underemployed or fully employed.³⁴ The base case outcome is ‘fully employed’. Estimates for the underemployed are very close to those of the probit models estimated on employed persons, possibly reflecting the IIA assumption underpinning multinomial logit.

For both males and females, there are a number of similarities between the factors associated with underemployment and those associated with unemployment. For males, the mean effects of being young, less educated, disabled, indigenous or an NESB immigrant, having a long-term history of unemployment, and a recent history of non-employment are, compared with being fully employed, to increase the probability of being unemployed and to also increase the probability of being underemployed (although the estimates of the effects of disability and lifetime unemployment for underemployment, and being indigenous for unemployment, are not significant at the 5 per cent level). Magnitudes of these effects are, furthermore, remarkably similar for unemployment and underemployment. Similarly, for females, the mean effects of being young, less educated and having both a short-term and a long-term history of both non-employment and unemployment are all to increase the probability of both unemployment and underemployment relative to full employment (although the effects of lifetime and recent non-employment on underemployment are not significant at the 5 per cent level).

³³ As noted earlier, these tests often give inconsistent results and provide little guidance to violations of the IIA assumption. They are therefore of limited value.

³⁴ Mean marginal effects sum to zero across the three outcomes, so that the mean marginal effect for one outcome can be inferred from the mean marginal effects of the other two outcomes. However, effects are reported for all three outcomes, since the statistical significance of the mean marginal effect for one outcome cannot necessarily be inferred from the statistical significance of the effects for the other two outcomes.

There are also some similarities between underemployment and unemployment in the factors that do not appear to have significant effects. For both males and females, region of residence, immigrant length of residency in Australia and English proficiency have insignificant effects on both the probability of unemployment and probability of underemployment.

Table 7.3: Multinomial logit estimates of mean marginal effects on the probability of being unemployed, underemployed or fully employed – Males in the labour force – Full-time workers can be underemployed

	Unemployed		Underemployed		Fully employed	
	MME	SE	MME	SE	MME	SE
Aged 25-34	-0.031	0.007*	-0.036	0.013*	0.067	0.014*
Aged 35-44	-0.035	0.008*	-0.072	0.013*	0.107	0.014*
Aged 45-54	-0.035	0.008*	-0.100	0.012*	0.135	0.014*
Aged 55-64	-0.029	0.008*	-0.083	0.014*	0.112	0.015*
Degree	-0.032	0.008*	-0.057	0.014*	0.090	0.015*
Other P-S	-0.013	0.007	-0.011	0.012	0.023	0.013
Comp H-S	-0.012	0.008	-0.007	0.015	0.018	0.016
City	0.005	0.006	0.003	0.011	-0.008	0.011
Disabled	0.026	0.011*	0.024	0.020	-0.050	0.021*
Couple	-0.004	0.008	-0.053	0.014*	0.057	0.015*
Sole parent	0.036	0.029	-0.030	0.028	-0.006	0.038
Couple parents	0.009	0.012	-0.063	0.018*	0.054	0.020*
No. dep <15	-0.009	0.005	0.007	0.007	0.002	0.008
No. dep 15-24	-0.010	0.008	0.038	0.012*	-0.029	0.013*
ATSI	0.055	0.035	0.106	0.052*	-0.161	0.058*
ESB Immigrant	0.050	0.033	-0.017	0.042	-0.033	0.046
NESB Immigrant	0.058	0.029*	0.134	0.046*	-0.192	0.049*
Poor English	0.042	0.034	0.037	0.053	-0.078	0.059
YSM	-0.001	0.002	-0.001	0.005	0.002	0.005
YSM2	1.41E-04	5.72E-04	6.34E-05	9.75E-04	-2.04E-04	9.97E-04
YSM-NESB	-8.16E-04	0.003	-0.003	0.006	0.003	0.006
YSM2-NESB	2.82E-04	6.49E-04	-1.03E-04	1.19E-03	-1.80E-04	1.21E-03
Region unemp	0.001	0.002	0.007	0.003*	-0.008	0.003*
Not emp - life	3.95E-04	2.59E-04	3.72E-04	4.93E-04	-7.67E-04	5.30E-04
Unemp - life	1.21E-03	3.87E-04*	1.24E-03	8.76E-04	-2.45E-03	1.02E-03*
Not emp - year	7.88E-04	1.57E-04*	9.48E-04	4.35E-04*	-1.74E-03	4.60E-04*
Unemp - year	9.28E-04	1.85E-04*	1.01E-03	5.93E-04	-1.94E-03	6.56E-04*
No. jobs - year	-0.026	0.008*	0.031	0.007*	-0.005	0.009
IIA tests:						
Hausman (χ^2)	4.005		-14.525			
Small-Hsiao (χ^2)	38.068		67.78#			
Pseudo R-squared			0.2391			
Sample size			4775			

Note: MME: Mean Marginal Effect. SE: Standard error. * indicates significance at the 5% level. 'Fully employed' is the base case. # denotes rejection at the 5% level of the null hypothesis of IIA.

Table 7.3 continued: Multinomial logit estimates of mean marginal effects on the probability of being unemployed, underemployed or fully employed – Males in the labour force – Only part-time workers can be underemployed

	Unemployed		Underemployed		Fully employed	
	MME	SE	MME	SE	MME	SE
Aged 25-34	-0.032	0.007*	-0.048	0.008*	0.079	0.01*
Aged 35-44	-0.036	0.008*	-0.051	0.009*	0.086	0.011*
Aged 45-54	-0.036	0.008*	-0.053	0.008*	0.089	0.010*
Aged 55-64	-0.030	0.007*	-0.019	0.012	0.049	0.013*
Degree	-0.032	0.008*	-0.030	0.010*	0.063	0.011*
Other P-S	-0.012	0.007	-0.024	0.008*	0.036	0.010*
Comp H-S	-0.011	0.008	0.011	0.011	1.48E-04	0.013
City	0.005	0.006	3.37E-04	0.008	-0.005	0.009
Disabled	0.026	0.010*	0.026	0.015	-0.052	0.017*
Couple	-0.003	0.008	-0.028	0.009*	0.032	0.012*
Sole parent	0.041	0.030	0.002	0.022	-0.043	0.037
Couple parents	0.009	0.013	-0.022	0.013	0.013	0.017
No. dep <15	-0.009	0.005	0.002	0.005	0.007	0.007
No. dep 15-24	-0.009	0.008	0.036	0.008*	-0.027	0.010*
ATSI	0.055	0.034	0.043	0.038	-0.098	0.054
ESB Immigrant	0.051	0.034	-0.040	0.028	-0.010	0.039
NESB Immigrant	0.052	0.027	0.034	0.029	-0.086	0.036*
Poor English	0.042	0.034	-0.025	0.029	-0.017	0.041
YSM	-0.002	0.003	0.004	0.005	-0.003	0.005
YSM2	1.89E-04	5.90E-04	-8.93E-04	8.84E-04	7.03E-04	9.00E-04
YSM-NESB	-1.39E-04	2.98E-03	-0.006	0.006	0.006	0.006
YSM2-NESB	1.66E-04	6.71E-04	8.01E-04	1.10E-03	-9.67E-04	1.13E-03
Region unemp	0.001	0.002	0.004	0.002*	-0.005	0.002*
Not emp - life	4.42E-04	2.54E-04	8.83E-04	3.09E-04*	-1.32E-03	3.90E-04*
Unemp - life	1.13E-03	3.83E-04*	5.80E-05	5.62E-04	-1.18E-03	7.59E-04
Not emp - year	7.73E-04	1.60E-04*	3.88E-04	2.81E-04	-1.16E-03	3.18E-04*
Unemp - year	9.47E-04	1.86E-04*	8.14E-04	3.53E-04*	-1.76E-03	4.24E-04*
No. jobs - year	-0.026	0.008*	0.028	0.005*	-0.002	0.008
IIA tests:						
Hausman (χ^2)	1110.023#		-41.763			
Small-Hsiao (χ^2)	54.432#		29.771			
Pseudo R-squared			0.3103			
Sample size			4775			

Note: MME: Mean Marginal Effect. SE: Standard error. * indicates significance at the 5% level. 'Fully employed' is the base case. # denotes rejection at the 5% level of the null hypothesis of IIA.

Table 7.3 continued: Multinomial logit estimates of mean marginal effects on the probability of being unemployed, underemployed or fully employed – Females in the labour force – Full-time workers can be underemployed

	Unemployed		Underemployed		Fully employed	
	MME	SE	MME	SE	MME	SE
Aged 25-34	-0.037	0.007*	-0.075	0.015*	0.112	0.016*
Aged 35-44	-0.041	0.007*	-0.067	0.015*	0.107	0.016*
Aged 45-54	-0.028	0.007*	-0.114	0.014*	0.142	0.015*
Aged 55-64	-0.043	0.007*	-0.109	0.015*	0.151	0.016*
Degree	-0.021	0.008*	-0.073	0.014*	0.094	0.015*
Other P-S	-0.014	0.007*	-0.034	0.014*	0.047	0.014*
Comp H-S	-0.023	0.008*	-0.024	0.017	0.047	0.017*
City	0.010	0.007	5.59E-04	0.012	-0.011	0.013
Disabled	0.011	0.012	0.019	0.023	-0.029	0.025
Couple	-0.010	0.009	-0.042	0.015*	0.052	0.016*
Sole parent	0.015	0.015	0.027	0.028	-0.042	0.030
Couple parents	-0.011	0.012	-0.054	0.022*	0.065	0.024*
No. dep <15	-0.003	0.005	0.023	0.009*	-0.020	0.009*
No. dep 15-24	0.011	0.006	0.006	0.014	-0.017	0.015
ATSI	0.047	0.025	-0.020	0.037	-0.027	0.044
ESB Immigrant	0.047	0.041	-0.075	0.048	0.028	0.057
NESB Immigrant	-0.004	0.023	0.196	0.059*	-0.192	0.059*
Poor English	-4.45E-04	0.022	-0.071	0.040	0.071	0.045
YSM	-0.001	0.003	0.008	0.007	-0.007	0.006
YSM2	9.90E-05	5.93E-04	-0.001	0.001	0.001	0.001
YSM-NESB	0.004	0.004	-0.018	0.008*	0.014	0.008
YSM2-NESB	-8.47E-04	8.63E-04	0.003	0.002	-0.002	0.002
Region unemp	0.002	0.002	0.003	0.003	-0.005	0.003
Not emp - life	3.00E-04	1.42E-04*	5.12E-04	3.0E-04	-8.13E-04	3.17E-04*
Unemp - life	8.33E-04	2.96E-04*	2.84E-03	1.01E-03*	-3.67E-03	1.12E-03*
Not emp - year	8.21E-04	1.26E-04*	4.88E-04	3.18E-04	-1.31E-03	3.26E-04*
Unemp - year	5.07E-04	1.43E-04*	1.29E-03	5.69E-04*	-1.80E-03	6.22E-04*
No. jobs - year	-0.038	0.009*	0.025	0.009*	0.014	0.011
IIA tests:						
Hausman (χ^2)		-12.974		-25.143		
Small-Hsiao (χ^2)		18.398		28.341		
Pseudo R-squared				0.1932		
Sample size				4186		

Note: MME: Mean Marginal Effect. SE: Standard error. * indicates significance at the 5% level. 'Fully employed' is the base case. # denotes rejection at the 5% level of the null hypothesis of IIA.

Table 7.3 continued: Multinomial logit estimates of mean marginal effects on the probability of being unemployed and underemployed versus fully employed – Females in the labour force – Only part-time workers can be underemployed

	Unemployed		Underemployed		Fully employed	
	MME	SE	MME	SE	MME	SE
Aged 25-34	-0.036	0.008*	-0.071	0.013*	0.107	0.015*
Aged 35-44	-0.040	0.008*	-0.068	0.014*	0.108	0.015*
Aged 45-54	-0.028	0.007*	-0.093	0.013*	0.121	0.014*
Aged 55-64	-0.042	0.007*	-0.081	0.016*	0.124	0.016*
Degree	-0.021	0.008*	-0.055	0.013*	0.076	0.014*
Other P-S	-0.014	0.007*	-0.035	0.013*	0.049	0.013*
Comp H-S	-0.023	0.008*	-0.021	0.015	0.044	0.016*
City	0.010	0.007	-0.007	0.012	-0.003	0.012
Disabled	0.010	0.012	0.034	0.024	-0.044	0.025
Couple	-0.010	0.009	-0.020	0.015	0.030	0.016
Sole parent	0.015	0.015	0.079	0.031*	-0.094	0.033*
Couple parents	-0.011	0.013	0.001	0.023	0.010	0.025
No. dep <15	-0.003	0.005	0.022	0.008*	-0.019	0.009*
No. dep 15-24	0.011	0.006	-0.002	0.013	-0.009	0.014
ATSI	0.047	0.025	-0.022	0.033	-0.025	0.042
ESB Immigrant	0.047	0.043	-0.107	0.037*	0.060	0.051
NESB Immigrant	-0.005	0.023	0.157	0.059*	-0.152	0.058*
Poor English	1.21E-04	0.022	-0.060	0.038	0.060	0.042
YSM	-0.002	0.003	0.014	0.007*	-0.012	0.006*
YSM2	1.62E-04	6.11E-04	-0.002	0.001*	0.002	0.001*
YSM-NESB	0.005	0.004	-0.024	0.008*	0.019	0.008*
YSM2-NESB	-9.47E-04	8.92E-04	0.004	0.001*	-0.003	0.001*
Region unemp	0.002	0.002	0.005	0.003	-0.006	0.003*
Not emp - life	3.02E-04	1.46E-04*	5.55E-04	2.71E-04*	-8.56E-04	2.90E-04*
Unemp - life	8.77E-04	3.04E-04*	3.02E-03	8.99E-04*	-3.89E-03	1.03E-03*
Not emp - year	8.18E-04	1.25E-04*	3.38E-04	2.94E-04	-1.16E-03	3.04E-04*
Unemp - year	5.17E-04	1.44E-04*	1.37E-03	5.16E-04*	-1.89E-03	5.67E-04*
No. jobs - year	-0.038	0.008*	0.020	0.008*	0.018	0.010
IIA tests:						
Hausman (χ^2)	-0.837		13.431			
Small-Hsiao (χ^2)	33.331		43.218			
Pseudo R-squared			0.2031			
Sample size			4186			

Note: MME: Mean Marginal Effect. SE: Standard error. * indicates significance at the 5% level. 'Fully employed' is the base case. # denotes rejection at the 5% level of the null hypothesis of IIA.

While there are similarities, there are, however, also some notable differences between the factors associated with unemployment and those associated with underemployment. Important differences are evident for both males and females with respect to income unit type, number of dependent children and number of jobs held in the preceding financial year. Income unit type is not associated with significant effects on the probability of unemployment, but is for the probability of underemployment, with being single having a positive effect on the probability of underemployment. Similarly, the number of dependent children appears to play no role in

unemployment, but does for underemployment – the probability of underemployment is increasing in the number of dependents aged under 15 for females (at an average rate of 0.023 per child), and increasing in the number of dependents aged 15-24 for males (at an average rate of 0.038 per child). It is possible that both the income unit type and dependent children effects, present for underemployment but not unemployment, reflect labour supply preferences, although explanation of how labour supply preferences could translate into these effects is not straightforward. A possible explanation of the income unit type effects is that they may reflect a general preference for more total hours of employment among single people. With respect to the dependent children effects, these may represent a desire to work more hours that is not fulfilled because of family commitments (as opposed to labour demand), with the extent to which family commitments constrain working hours increasing in the number of children.

With regard to the number of jobs held in the last year, the effects attributable to this variable capture an importance difference between the underemployed and the unemployed, which is that the underemployed have a foothold in the labour market. The number of jobs held has a negative mean effect on the probability of unemployment, but a positive mean effect on the probability of underemployment – more jobs in the recent past is helpful for avoiding unemployment, but appears to reflect difficulty finding ‘good’ employment.

A further interesting difference between underemployment and unemployment for males is that while the probability of underemployment is increasing in the local unemployment rate, there is no significant effect evident for unemployment. This is perhaps surprising, and is difficult to explain, as indeed is the absence for females of a significant effect for both unemployment and underemployment. However, it should be noted that point estimates imply a positive effect of the local unemployment rate on the probability of both unemployment and underemployment for both males and females.

For females, there are several other differences in mean marginal effects estimates. These include a positive mean effect on unemployment, but not underemployment, associated with being indigenous, and a positive mean effect on underemployment, but not unemployment, associated with being an NESB immigrant. Length of female immigrant residency in Australia also has significant mean marginal effects on the likelihood of underemployment when we restrict the definition of underemployment to part-time workers, effects that are not evident for the probability of unemployment.

Multinomial logit models with two levels of underemployment

Intuitively, we might expect the predictors of unemployment to have more in common with the predictors of ‘severe’ underemployment, where a large number of additional hours of employment are sought, than with the predictors of ‘mild’ underemployment, where only a few extra hours are sought. This issue is investigated by estimating multinomial logit models with four outcomes: unemployed, ‘very’ underemployed (desiring an additional 10 or more hours of work per week), ‘mildly’ underemployed (desiring fewer than 10 additional hours of work per week) and fully employed.

A critical problem with the four-outcome model, however, is that the IIA assumption is much more likely to be violated. For example, the probability of being mildly underemployed versus fully employed is very much likely to depend on whether the possibility of being very underemployed exists. The Small-Hsiao tests do indeed strongly suggest the IIA assumption is violated for all of the specifications estimated with two levels of underemployment.³⁵ It is

³⁵ Hausman test statistics do not support the Small-Hsiao test results. However, they are mostly negative, which violates the asymptotic assumptions of the test. See Long and Freese (2001) for further discussion of this issue.

therefore not clear the results are valid and, at the very least, some caution is warranted in interpreting the results.

Table 7.4: Logit coefficient estimates – Mean marginal effects – Two levels of underemployment – Males – Full-time workers can be underemployed

	Unemployed		Very under		Mildly under		Fully Employed	
	MME	SE	MME	SE	MME	SE	MME	SE
Aged 25-34	-0.031	0.007*	-0.018	0.010	-0.018	0.009*	0.067	0.014*
Aged 35-44	-0.035	0.008*	-0.039	0.011*	-0.033	0.009*	0.107	0.015*
Aged 45-54	-0.035	0.008*	-0.048	0.010*	-0.052	0.008*	0.135	0.014*
Aged 55-64	-0.029	0.008*	-0.037	0.013*	-0.044	0.009*	0.111	0.015*
Degree	-0.032	0.008*	-0.032	0.012*	-0.024	0.011*	0.089	0.016*
Other P-S	-0.013	0.007	-0.009	0.010	-0.001	0.009	0.022	0.013
Comp H-S	-0.012	0.008	0.002	0.013	-0.008	0.010	0.018	0.016
City	0.005	0.006	-0.003	0.009	0.005	0.007	-0.007	0.012
Disabled	0.026	0.011*	0.028	0.016	-0.005	0.013	-0.049	0.020*
Couple	-0.004	0.008	-0.035	0.010*	-0.019	0.009*	0.057	0.014*
Sole parent	0.036	0.030	-0.044	0.018*	0.015	0.025	-0.006	0.040
Couple parents	0.008	0.012	-0.047	0.015*	-0.016	0.013	0.054	0.021*
No. dep <15	-0.009	0.005	0.012	0.006*	-0.006	0.005	0.003	0.008
No. dep 15-24	-0.009	0.008	0.008	0.011	0.026	0.008*	-0.024	0.013
ATSI	0.056	0.035	0.097	0.047*	0.010	0.031	-0.162	0.057*
ESB Immigrant	0.050	0.034	-0.011	0.033	-0.007	0.028	-0.033	0.047
NESB Immigrant	0.059	0.027*	0.105	0.040*	0.026	0.028	-0.190	0.047*
Poor English	0.038	0.033	-0.017	0.032	0.071	0.055	-0.092	0.062
YSM	-0.001	0.002	6.82E-04	3.57E-03	-0.002	0.004	0.002	0.005
YSM2	1.49E-04	5.62E-04	-3.23E-04	6.91E-04	3.42E-04	8.80E-04	-1.68E-04	1.06E-03
YSM-NESB	-8.00E-04	2.79E-03	-0.002	0.004	-5.63E-04	4.38E-03	0.003	0.006
YSM2-NESB	2.78E-04	6.39E-04	-3.22E-05	9.28E-04	-5.81E-05	1.03E-03	-1.87E-04	1.31E-03
Region unemp	0.001	0.002	0.003	0.002	0.003	0.002	-0.008	0.003*
Not emp - life	4.02E-04	2.62E-04	4.96E-04	3.52E-04	-1.82E-04	4.50E-04	-7.16E-04	5.51E-04
Unemp - life	1.21E-03	3.96E-04*	5.34E-04	5.87E-04	7.54E-04	6.52E-04	-2.49E-03	1.02E-03*
Not emp - year	7.87E-04	1.57E-04*	9.89E-04	3.05E-04*	-1.78E-04	4.17E-04	-1.60E-03	5.01E-04*
Unemp - year	9.29E-04	1.88E-04*	3.86E-04	4.05E-04	6.63E-04	5.20E-04	-1.98E-03	7.20E-04*
No. jobs - year	-0.026	0.008*	0.026	0.006*	0.004	0.005	-0.004	0.010

IIA tests:

Hausman (χ^2)	-22.685	-7.875	18.630
Small-Hsiao (χ^2)	60.809#	48.386#	78.390#

Pseudo R-squared 0.2154
Sample size 4775

Note: MME: Mean Marginal Effect. SE: Standard error. * indicates significance at the 5% level. 'Fully employed' is the base case. # denotes rejection at the 5% level of the null hypothesis of IIA.

Table 7.4 continued: Logit coefficient estimates – Mean marginal effects – Two levels of underemployment – Males – Only part-time workers can be underemployed

	Unemployed		Very under		Mildly under		Fully Employed	
	MME	SE	MME	SE	MME	SE	MME	SE
Aged 25-34	-0.031	0.007*	-0.027	0.007*	-0.020	0.005*	0.078	0.010*
Aged 35-44	-0.035	0.008*	-0.025	0.008*	-0.024	0.005*	0.085	0.011*
Aged 45-54	-0.037	0.008*	-0.026	0.008*	-0.025	0.005*	0.087	0.011*
Aged 55-64	-0.031	0.008*	-0.008	0.011	-0.008	0.007	0.047	0.013*
Degree	-0.032	0.008*	-0.019	0.008*	-0.009	0.006	0.061	0.012*
Other P-S	-0.012	0.007	-0.010	0.007	-0.012	0.005*	0.035	0.010*
Comp H-S	-0.012	0.008	0.017	0.011	-0.003	0.005	-0.002	0.013
City	0.005	0.006	-0.001	0.006	0.001	0.004	-0.005	0.009
Disabled	0.027	0.010*	0.024	0.013	-1.29E-04	0.008	-0.050	0.017*
Couple	-0.003	0.008	-0.021	0.007*	-0.008	0.006	0.032	0.012*
Sole parent	0.041	0.030	-0.022	0.014	0.025	0.020	-0.043	0.038
Couple parents	0.009	0.012	-0.028	0.012*	0.006	0.009	0.013	0.017
No. dep <15	-0.009	0.005	0.006	0.005	-0.004	0.003	0.007	0.007
No. dep 15-24	-0.008	0.008	0.014	0.007*	0.015	0.004*	-0.021	0.010*
ATSI	0.055	0.035	0.033	0.034	0.010	0.017	-0.098	0.053
ESB Immigrant	0.051	0.035	-0.020	0.028	-0.025	0.027	-0.006	0.045
NESB Immigrant	0.052	0.027	0.026	0.025	0.008	0.020	-0.085	0.037*
Poor English	0.040	0.034	-0.027	0.021	0.009	0.032	-0.023	0.046
YSM	-0.002	0.139	0.001	0.127	0.004	1.294	-0.004	1.031
YSM2	2.17E-04	0.036	-3.15E-04	0.032	-7.95E-04	0.328	8.93E-04	0.261
YSM-NESB	-8.06E-06	0.140	-0.002	0.127	-0.005	1.297	0.007	1.034
YSM2-NESB	1.49E-04	0.036	2.27E-04	0.032	6.91E-04	0.331	-0.001	0.264
Region unemp	0.001	0.002	0.003	0.002	0.001	0.001	-0.005	0.002*
Not emp - life	4.38E-04	2.52E-04	6.46E-04	2.54E-04*	2.54E-04	1.96E-04	-1.34E-03	3.80E-04*
Unemp - life	1.13E-03	3.82E-04*	8.47E-05	4.17E-04	-3.87E-05	3.65E-04	-1.17E-03	7.38E-04
Not emp - year	7.68E-04	2.18E-04*	4.88E-04	2.82E-04	-1.10E-04	0.002	-1.15E-03	1.42E-03
Unemp - year	9.50E-04	2.40E-04*	4.15E-04	3.26E-04	3.89E-04	0.002	-1.75E-03	1.44E-03*
No. jobs - year	-0.026	0.008*	0.022	0.004*	0.006	0.003*	-0.001	0.008
IIA tests:								
Hausman (χ^2)	-270.888		-1.097		-71.292			
Small-Hsiao (χ^2)	129.765#		115.849#		83.914#			
Pseudo R-squared	0.2993							
Sample size	4775							

Note: MME: Mean Marginal Effect. SE: Standard error. * indicates significance at the 5% level. 'Fully employed' is the base case. # denotes rejection at the 5% level of the null hypothesis of IIA.

Table 7.4 continued: Logit coefficient estimates – Mean marginal effects – Two levels of underemployment – Females – Full-time workers can be underemployed

	Unemployed		Very under		Mildly under		Fully Employed	
	MME	SE	MME	SE	MME	SE	MME	SE
Aged 25-34	-0.036	0.008*	-0.022	0.012	-0.054	0.009*	0.112	0.016*
Aged 35-44	-0.041	0.008*	-0.027	0.012*	-0.038	0.011*	0.106	0.017*
Aged 45-54	-0.028	0.007*	-0.061	0.011*	-0.053	0.009*	0.142	0.015*
Aged 55-64	-0.042	0.007*	-0.054	0.013*	-0.054	0.009*	0.151	0.016*
Degree	-0.021	0.008*	-0.040	0.011*	-0.033	0.010*	0.094	0.015*
Other P-S	-0.014	0.007*	-0.029	0.010*	-0.004	0.010	0.047	0.014*
Comp H-S	-0.023	0.008*	-0.011	0.013	-0.013	0.011	0.046	0.017*
City	0.010	0.006	-0.015	0.010	0.015	0.009	-0.010	0.013
Disabled	0.011	0.012	0.028	0.020	-0.010	0.016	-0.029	0.025
Couple	-0.010	0.008	-0.021	0.012	-0.022	0.011*	0.053	0.016*
Sole parent	0.015	0.015	0.040	0.024	-0.008	0.017	-0.047	0.031
Couple parents	-0.011	0.012	-0.026	0.018	-0.025	0.016	0.063	0.025*
No. dep <15	-0.003	0.005	0.008	0.007	0.014	0.006*	-0.019	0.009*
No. dep 15-24	0.013	0.006*	-0.025	0.013	0.020	0.009*	-0.007	0.015
ATSI	0.047	0.024	-0.017	0.027	-0.001	0.028	-0.028	0.044
ESB Immigrant	0.046	0.042	-0.079	0.031*	0.008	0.043	0.026	0.060
NESB Immigrant	-0.004	0.023	0.147	0.054*	0.047	0.042	-0.190	0.059*
Poor English	-6.75E-04	0.021	-0.042	0.029	-0.028	0.033	0.071	0.046
YSM	-0.002	0.003	0.010	0.006	-7.14E-04	0.005	-0.008	0.007
YSM2	1.26E-04	6.16E-04	-0.002	0.001*	1.07E-04	1.07E-03	0.001	0.001
YSM-NESB	0.004	0.004	-0.016	0.007*	-0.003	0.006	0.015	0.008
YSM2-NESB	-8.70E-04	8.76E-04	0.003	0.001	4.87E-04	1.29E-03	-0.002	0.002
Region unemp	0.002	0.002	0.003	0.002	7.05E-04	2.08E-03	-0.005	0.003
Not emp - life	3.01E-04	1.44E-04*	3.45E-04	2.31E-04	1.65E-04	2.15E-04	-8.11E-04	3.13E-04*
Unemp - life	8.76E-04	2.97E-04*	1.91E-03	6.52E-04*	6.59E-04	7.35E-04	-3.45E-03	1.16E-03*
Not emp - year	8.14E-04	1.27E-04*	3.09E-04	2.44E-04	1.86E-04	2.41E-04	-1.31E-03	3.36E-04*
Unemp - year	5.30E-04	1.44E-04*	1.05E-03	3.88E-04*	2.83E-06	4.93E-04	-1.58E-03	6.69E-04*
No. jobs - year	-0.038	0.009*	0.017	0.006*	0.008	0.006	0.014	0.010
IIA tests:								
Hausman (χ^2)		-2.444		-6.790		-33.178		
Small-Hsiao (χ^2)		-1082.142#		-856.664#		-787.547#		
Pseudo R-squared					0.1751			
Sample size					4186			

Note: MME: Mean Marginal Effect. SE: Standard error. * indicates significance at the 5% level. 'Fully employed' is the base case. # denotes rejection at the 5% level of the null hypothesis of IIA.

Table 7.4 continued: Logit coefficient estimates – Mean marginal effects – Two levels of underemployment – Females – Only part-time workers can be underemployed

	Unemployed		Very under		Mildly under		Fully Employed	
	MME	SE	MME	SE	MME	SE	MME	SE
Aged 25-34	-0.036	0.008*	-0.027	0.012*	-0.045	0.008*	0.108	0.015*
Aged 35-44	-0.040	0.008*	-0.032	0.012*	-0.035	0.010*	0.108	0.015*
Aged 45-54	-0.028	0.007*	-0.054	0.011*	-0.040	0.008*	0.121	0.014*
Aged 55-64	-0.042	0.007*	-0.044	0.013*	-0.037	0.009*	0.124	0.016*
Degree	-0.021	0.008*	-0.030	0.011*	-0.025	0.009*	0.076	0.015*
Other P-S	-0.014	0.007*	-0.027	0.010*	-0.007	0.009	0.048	0.014*
Comp H-S	-0.023	0.008*	-0.011	0.013	-0.010	0.010	0.044	0.016*
City	0.010	0.007	-0.018	0.009*	0.011	0.008	-0.002	0.013
Disabled	0.010	0.012	0.034	0.019	-8.96E-04	0.015	-0.043	0.024
Couple	-0.010	0.009	-0.013	0.012	-0.007	0.011	0.030	0.017
Sole parent	0.014	0.015	0.068	0.028*	0.017	0.020	-0.099	0.034*
Couple parents	-0.012	0.013	-0.001	0.018	0.006	0.015	0.007	0.025
No. dep <15	-0.003	0.005	0.009	0.006	0.012	0.005*	-0.018	0.009*
No. dep 15-24	0.013	0.006*	-0.027	0.013*	0.014	0.007*	7.36E-04	0.015
ATSI	0.047	0.024	-0.011	0.026	-0.012	0.024	-0.024	0.042
ESB Immigrant	0.047	0.042	-0.067	0.033*	-0.042	0.029	0.062	0.051
NESB Immigrant	-0.006	0.022	0.094	0.047*	0.066	0.046	-0.155	0.057*
Poor English	3.35E-04	0.022	-0.026	0.031	-0.037	0.023	0.063	0.041
YSM	-0.002	0.003	0.008	0.006	0.006	0.006	-0.013	0.008
YSM2	1.70E-04	5.99E-04	-0.001	0.001	-0.001	0.001	0.002	0.001*
YSM-NESB	0.005	0.004	-0.012	0.007	-0.012	0.007	0.020	0.009*
YSM2-NESB	-9.56E-04	8.79E-04	0.002	0.001*	0.002	0.001*	-0.004	0.002*
Region unemp	0.002	0.002	0.004	0.002*	9.07E-04	1.95E-03	-0.006	0.003*
Not emp - life	3.00E-04	1.46E-04*	3.60E-04	2.12E-04*	2.00E-04	1.94E-04	-8.60E-04	2.95E-04*
Unemp - life	9.23E-04	3.02E-04*	2.04E-03	5.89E-04*	7.20E-04	6.90E-04	-3.68E-03	1.09E-03*
Not emp - year	8.12E-04	1.28E-04*	1.91E-04	2.35E-04	1.58E-04	2.01E-04	-1.16E-03	3.12E-04*
Unemp - year	5.36E-04	1.49E-04*	1.11E-03	3.61E-04*	1.87E-05	4.79E-04	-1.67E-03	6.43E-04*
No. jobs - year	-0.039	0.009*	0.017	0.006*	0.003	0.006	0.019	0.010
IIA tests:								
Hausman (χ^2)	-1.093		2.775		8.154			
Small-Hsiao (χ^2)	90.022#		64.753#		103.374#			
Pseudo R-squared	0.1868							
Sample size	4186							

Note: MME: Mean Marginal Effect. SE: Standard error. * indicates significance at the 5% level. 'Fully employed' is the base case. # denotes rejection at the 5% level of the null hypothesis of IIA.

Notwithstanding the apparent violations of the IIA assumption, results for two specifications are reported in Table 7.4. While a number of factors are similar in effects for the two levels of underemployment, for both males and females the effects of the employment history variables are confined to severe underemployment – or, to put it another way, the effects evident for all underemployment appear to be driven by their effects on severe underemployment. There are therefore important differences between the severely and mildly underemployed. Employment history variables are likely to capture, to some extent, characteristics such as unobserved human

capital. On the basis of these results, therefore, lower human capital (that is not captured by observed characteristics such as educational attainment) increases the probability of severe underemployment, as it does unemployment. It is not, however, the driver of mild underemployment.

7.3. The extent of underemployment among underemployed persons

OLS regression models of the extent of underemployment among the underemployed show most characteristics do not have a statistically significant impact at the 5 per cent level. Table 7.5 presents estimates for one of the estimated specifications, in which all employed persons desiring more hours of employment are treated as underemployed.³⁶ The dependent variable is ‘the number of additional hours of employment desired’. For males, none of the variables for socio-demographic characteristics exerts an impact on the extent of underemployment that is significant at the 5 per cent level. For females, only three of the socio-demographic variables have significant coefficients – specifically, there are significant positive coefficients for the ‘disabled’ and ‘poor English’ dummies, and a significant negative coefficient for the ‘years-since-migration’ variable.

Although all other socio-demographic variables do not have effects that are significant at the 5 per cent level, several variables do have weakly significant coefficient estimates. The point estimates imply, given a person is underemployed, each dependent child aged 15-24 decreases underemployment by 1.6 hours for males (significant at the 7 per cent level) and by 0.9 hours for females (significant at the 18 per cent level). Residing in a major city (as opposed to a regional, rural or remote location) also decreases the extent of underemployment, by 1.4 hours for males (significant at the 7 per cent level) and by 1 hour for females (significant at the 14 per cent level). The local unemployment rate also has negative effects on the extent of underemployment for males (significant at the 6 per cent level), which is hard to explain, but also not of a large magnitude: a one percentage point increase in the local unemployment rate is associated with a 0.32 hours decrease in the extent of underemployment.

Turning to the variables for employment history, consistent with the finding in Section 7.2 that recent employment history affects the likelihood of severe underemployment, but not mild underemployment, the point estimates imply that the extent of underemployment is increasing in the proportion of the preceding year not employed for both males and females. The coefficient estimates are, however, only significant at the 8 per cent level. For males, there are also significant coefficient estimates for the extent of underemployment is also increasing in the number of jobs held in the preceding year.

None of the variables for employment characteristics are statistically significant for females, while for males only the self employed dummy and the variable for tenure with current employer are significant (the latter only at the 6 per cent level). The coefficient on the self employed dummy implies that, all else equal, underemployed males who are self employed have 2.8 more hours of underemployment than other underemployed males. The coefficient estimate for employment tenure implies that the extent of underemployment is, all else equal, 0.12 hours less per year with current employer, which is consistent with longer tenure reflecting a good match between firm and worker.

³⁶ A number of alternative specifications were estimated, with a similar absence of statistically significant estimates.

Table 7.5: OLS estimates of the extent of underemployment among the underemployed – Full-time workers can be underemployed

	Males		Females			Males		Females	
	Coef.	SE	Coef.	SE		Coef.	SE	Coef.	SE
Aged 25-34	-0.886	0.940	1.779	0.974	Tenure	-0.122	0.065	-0.030	0.072
Aged 35-44	-0.027	1.078	1.529	1.003	Indacom	1.669	1.885	2.161	2.075
Aged 45-54	0.757	1.246	0.254	1.137	Indcommun	-1.894	2.359	-0.180	2.802
Aged 55-64	-0.070	1.678	0.658	1.602	Indconstr	1.432	1.717	-2.610	3.242
Degree	-0.939	1.295	0.356	1.039	Indcultrec	2.892	2.252	-0.125	2.520
Other P-S	-1.106	0.826	-0.800	0.760	Indeduc	0.943	2.120	-1.260	2.099
Comp H-S	0.789	1.001	1.214	0.914	Indelec	-0.836	3.812	-	
City	-1.371	0.751	-0.990	0.669	Indfinance	-2.837	3.678	-1.001	2.760
Disabled	1.087	1.082	2.874	1.139*	Indgovdef	1.023	2.212	0.399	2.966
Couple	0.416	0.954	-0.260	0.864	Indhlthcs	0.250	2.117	0.208	2.040
Sole parent	-1.123	2.140	1.500	1.326	Indmanuf	-0.122	1.649	0.255	2.268
Couple parents	0.012	1.314	-1.170	1.242	Indmining	2.974	2.923	-	
No. dep <15	0.118	0.506	-0.010	0.478	Indperserv	-0.290	2.146	-1.610	2.294
No. dep 15-24	-1.599	0.867	-0.920	0.679	Indpropbus	0.895	1.779	0.599	2.074
ATSI	1.242	2.005	-0.030	2.050	Indrtrade	-1.364	1.662	-0.880	1.982
ESB Immigrant	1.240	2.764	-3.790	3.315	Indtrans	2.692	1.932	0.451	2.599
NESB Immigrant	1.264	1.832	0.502	1.765	Indwstrade	0.254	2.040	2.052	2.622
Poor English	-1.513	2.617	-1.250	3.306	Occmgr	3.172	2.077	-2.040	3.975
YSM	-0.215	0.290	0.610	0.289*	Occprof	-1.594	1.448	-0.420	1.354
YSM2	0.049	0.067	-0.140	0.059*	Occasprof	0.978	1.553	-1.998	1.417
YSM-NESB	0.385	0.368	-0.460	0.336	Occadvclerk	4.458	5.223	-0.460	1.663
YSM2-NESB	-0.090	0.089	0.108	0.069	Occintclerk	-0.698	1.305	-1.130	1.078
Region unemp	-0.322	0.166	0.176	0.155	Occelemclerk	0.855	1.244	-0.060	1.096
Not emp - life	0.066	0.028*	0.020	0.016	Occtrade	0.783	1.052	0.768	1.763
Unemp - life	-0.019	0.047	0.051	0.040	Occintprod	-0.676	1.133	-0.920	1.746
Not emp - year	0.042	0.023	0.027	0.015	Union	-0.329	0.774	-0.730	0.750
Unemp - year	-0.017	0.031	0.018	0.023	Self employed	2.777	0.998*	1.633	1.085
No. jobs - year	1.541	0.507*	0.084	0.430	Constant	12.32	2.217*	9.754	2.636*
Adj. R-squared	0.052		0.066						
Sample size	684		682						

Note: * indicates significance at the 5% level.

8. Conclusion

The evidence from Wave 1 of the HILDA survey is that underemployment is widespread and of significant proportions: over one in six employed persons expresses a preference for more hours of paid work, preferring, on average, approximately 12 hours more per week. While underemployment is by no means associated with as severe adverse consequences for welfare dependence and income as unemployment, it does appear to have detrimental consequences. Particularly telling is that, for both males and females, the adverse effects of part-time underemployment on subjective well-being (life satisfaction) are not far short of those associated with unemployment. It is also significant that, for part-time casual employees who prefer full-time work, adverse effects on welfare dependence and income attributable to underemployment, while still not as large as the effects of unemployment, are nonetheless very substantial.

Also notable for males is that full-time worker underemployment, which is more prevalent among males than part-time worker underemployment, is also associated with adverse outcomes for income and life satisfaction. This finding is somewhat at odds with the conventional wisdom that only part-time worker underemployment is likely to have adverse consequences of concern to policy-makers.

The findings on the predictors of underemployment are broadly consistent with previous Australian research. Specifically, for the (more limited) range of variables he had available, Wooden (1993) found similar effects to those found in this study. Facilitated by the comparative richness of the HILDA dataset, this study has identified additional significant factors associated with underemployment, including employment history, number of dependent children, the local unemployment rate, indigenous status, length of immigrant residency in Australia and employment tenure.

This study has also found that underemployment has many predictors in common with unemployment. There are, however, several important differences, including effects attributable to income unit 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 do not appear to have difficulty gaining a foothold in the labour market, but do have difficulty finding good jobs with adequate hours. The impacts associated with income unit 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, strictly speaking, not underemployment (although may nonetheless be a policy concern).

A number of worthwhile lines of inquiry in relation to underemployment, and preferences over working hours more generally, have not been considered by this study. Several warrant specific mention. First, the consideration of underemployment in the community as a whole has precluded detailed study of specific groups in the community, such as young people, people with disabilities, indigenous Australians, long-term income support customers and older people. Subject to sample size limitations, focusing on such groups would be a valuable exercise.

Second, as noted in Section 4, the study of the divergence between preferred and actual working hours more generally, rather than simply underemployment, is likely to produce useful findings. This approach could incorporate into the analysis unemployed persons, overemployed persons, and even persons not in the labour force. The consideration of preferred and actual hours of employment for all persons, irrespective of labour force status, would be especially interesting in the context of study at the household level of work-family decisions and outcomes. Study of working time preferences and outcomes at the household level could consider issues such as joint decision-making of family members regarding working-time preferences and the relationship between working-time preferences of an individual and actual (and preferred) working-time of that person's partner (including whether underemployment of an individual depends on the labour force status of his or her partner). This is a fertile and important area of investigation which goes to the heart of work-family decision-making and outcomes.

Third, the release of Wave 2 (and subsequent waves) of the HILDA survey raises the prospect of study of dynamic features of underemployment. That is, longitudinal information at the individual level can inform us on pathways to and from underemployment, and the determinants of those pathways. Important issues in this regard include the persistence of underemployment over time, and the circumstances (if any) under which underemployment is a predictor of future unemployment, and the circumstances under which it is a predictor of future full employment.

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Appendix A: Variable Descriptions

- Educational attainment (dummy variables):
 - *Degree*: highest educational qualification is a bachelor's degree or higher.
 - *Other P-S qual.*: Highest educational qualification is a post-school qualification other than 'degree'.
 - *CHS*: Have no post-school qualifications and have completed the highest level of secondary school.
 - *NCHS*: Have no post-school qualifications and have not completed the highest level of secondary school.
 - *At school*: Still at school. (*NCHS* and *At school* were collectively the omitted dummy in regression models.)
- *City* (reside in major city): Place of residence is one of the major cities of Australia (dummy variable). Derived from the Accessibility/Remoteness Index of Australia scores from the 1996 Census (see ABS (2001)).
- *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).
- Income unit type (dummy variables):
 - *Single*: Single person (the omitted dummy in regression models).
 - *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.
- *No. dep <15*: Number of dependent children aged under 15 years.
- *No. dep 15-24*: Number of dependent children aged 15-24 years.
- Ethnicity/Country of birth (dummy variables):
 - *ATSI*: Aboriginal or Torres Strait Islander
 - *ESB* (English-speaking background immigrant): Person born in New Zealand, the UK, Ireland, Northern America or South Africa.
 - *NESB* (Non-English-speaking background immigrant): Person born outside Australia who is not an ESB immigrant.
- *Poor English*: Respondent speaks English poorly or doesn't speak English at all (dummy variable).
- *YSM* (years since migration): 2001 minus year of arrival in Australia (0 for native-born persons).
- *YSM2*: *YSM* squared, divided by 10.
- *YSM-NESB*: *YSM* for NESB immigrants (0 for all others).
- *YSM2-NESB*: *YSM-NESB* squared, divided by 10.
- *Region unemp* (local unemployment rate): Unemployment rate in ABS statistical region in 2001 (%), derived from the 2001 Census. There are 63 statistical regions in Australia. See ABS (2003) for details.
- *Not emp – life* (proportion of life not employed (%)): Percentage 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 life not employed (%)): Percentage 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 (%)): Percentage of time employed in the 2000-2001 financial year.
- *Not emp – year* (proportion of last year not employed (%)): Percentage of time not employed in the 2000-2001 financial year.
- *Unemp – year* (proportion of last year unemployed (%)): Percentage 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.
- *Tenure*: Tenure with current employer (years).
- Industry of employment (dummy variables):
 - *Indaccom*: Accommodation, cafes and restaurants
 - *Indcommun*: Communication services
 - *Indconstr*: Construction
 - *Indcultrec*: Culture and recreation
 - *Indeduc*: Education
 - *Indelec*: Electricity, gas and water
 - *Indfinance*: Finance and insurance
 - *Indgovdef*: Government administration and defence
 - *Indhlthcs*: Health and community services
 - *Indmanuf*: Manufacturing
 - *Indmining*: Mining
 - *Indperserv*: Personal and other services
 - *Indpropbus*: Property and business services
 - *Indrtrade*: Retail trade
 - *Indtrans*: Transport and storage

- *Indwstrade*: Wholesale trade
- *Indagric*: Agriculture, forestry and fishing (the omitted dummy in regression models)
- Occupation of employment (dummy variables):
 - *Occmgr*: Managers and administrators
 - *Occprof*: Professionals
 - *Occasprof*: Associate professionals
 - *Occadvclerk*: Advanced clerical and service workers
 - *Occintclerk*: Intermediate clerical and service workers
 - *Occelemclerk*: Elementary clerks, sales workers and service workers
 - *Occtrade*: Tradespersons
 - *Occintprod*: Intermediate production and transport workers
 - *Occlabour*: Labourers and related workers (the omitted dummy in regression models)
- *Union*: Member of a trade union (dummy variable).
- *Self employed*: Employer, own-account worker, owner-manager or family helper (dummy variable).
- *Renter*: Pay rent or board for current residence (dummy variable).
- *Studying*: Currently enrolled part-time or full-time at an educational institution (dummy variable).
- *Part-time*: Employed part-time (dummy variable).
- *Casual*: Employed on a casual basis (dummy variable).
- *Looking for work*: Looked for work in the last 4 weeks (dummy variable).
- *Financial difficulty*: Household has at least some difficulty in making ends meet (dummy variable). Derived from response to the question ‘Thinking of your household’s total monthly income, is your household able to make ends meet with great difficulty, with difficulty, with some difficulty, fairly easily, easily or very easily?’
- *IS – IU* (income unit receives income support): One or more persons in the income unit currently receive income support payments (dummy variable).
- *SEIFA decile* (Index of relative socio-economic disadvantage in deciles): ABS’s socio-economic indicators for areas from the 1996 census. 1 = lowest decile, 10 = highest decile.
- *Income support receipt*: Dummy variable equal to 1 if any member of the income unit currently receives income support payments; 0 otherwise. If no member of the income unit is observed on income support payments and income support payments are missing for any member, the variable is set to missing.
- *Wage rate*: Current annual wage and salary income divided by (52.14 * current usual weekly hours of work in all jobs). Wages exclude business income; consequently, wage rate information is missing for self employed workers who report no wage or salary income.
- *Personal income* (Gross personal income from all sources in the preceding financial year): Derived from variables for gross wages and salary, pensions and benefits, business income, investment income and ‘other’ income. It is coded as missing if:
 - both gross wages and salary and pensions and benefits are missing; or
 - one of gross wages and salary and pensions and benefits is zero, and the other is missing; or
 - both gross wages and salary and pensions and benefits are zero and business income is missing; or
 - gross wages and salary, pensions and benefits and business income are zero and either investment or other income is missing.
- *Income unit equivalent income*: Income unit gross income from all sources in the preceding financial year, divided by the square root of the number of members of the income unit. It is missing if personal income is missing for any member.
- *Life satisfaction*: Respondent’s recorded score from 0 (completely dissatisfied) to 10 (completely satisfied) in answer to the question ‘All things considered, how satisfied are you with your life?’
- *Job satisfaction*: Respondent’s recorded score from 0 (completely dissatisfied) to 10 (completely satisfied) in answer to the question ‘All things considered, how satisfied are you with your job?’

Appendix B: Coefficient Estimates for Outcome Equations

Table B6.1

	1. Income support receipt				2. Equivalent income			
	Males		Females		Males		Females	
	MME	SE	MME	SE	Coef.	SE	Coef.	SE
Aged 25-34	0.057	0.020*	0.007	0.020	0.406	0.042*	0.272	0.040*
Aged 35-44	0.049	0.019*	0.038	0.020	0.502	0.043*	0.292	0.041*
Aged 45-54	0.060	0.020*	0.025	0.019	0.392	0.045*	0.268	0.041*
Aged 55-64	0.109	0.027*	0.123	0.030*	0.363	0.054*	0.181	0.054*
Degree	-0.071	0.013*	-0.066	0.014*	0.445	0.037*	0.303	0.034*
Other P-S	-0.017	0.011	-0.003	0.014	0.097	0.030*	0.019	0.031
Comp H-S	-0.017	0.015	0.039	0.019*	0.120	0.042*	-5.33E-04	0.041
City	-0.011	0.010	-0.040	0.012*	0.172	0.025*	0.225	0.025*
Disabled	0.127	0.020*	0.087	0.023*	-0.158	0.042*	-0.184	0.045*
Couple	0.012	0.016	-0.027	0.016	0.447	0.035*	0.658	0.033*
Sole parent	0.120	0.044*	0.285	0.038*	0.278	0.089*	-0.140	0.057*
Couple parents	0.052	0.019*	-0.037	0.023	0.275	0.048*	0.638	0.052*
No. dep <15	0.022	0.006*	0.006	0.008	-0.154	0.018*	-0.145	0.083
No. dep 15-24	0.048	0.011*	0.042	0.012*	0.196	0.034*	0.142	0.106
ATSI	0.070	0.044	0.121	0.047*	-0.190	0.098	-0.060	0.095
ESB Immigrant	-0.125	0.030*	-0.085	0.048	0.119	0.099	-0.177	0.146
NESB Immigrant	0.036	0.037	-0.013	0.042	-0.431	0.089*	-0.563	0.021*
Poor English	0.109	0.061	0.104	0.071	-0.300	0.136*	-0.417	0.032*
YSM	0.012	0.005*	0.009	0.006	-0.011	0.009	0.012	0.010
YSM2	-0.002	8.48E-04*	-1.80E-03	1.12E-03	0.002	0.002	-0.002	0.002
YSM-NESB	-0.017	0.006*	-0.008	0.007	0.032	0.012*	0.018	0.013
YSM2-NESB	0.003	0.001*	1.51E-03	1.39E-03	-0.005	0.003	-0.002	0.003
Constant					9.744	0.044*	9.768	0.046*
R-squared	0.254		0.232		0.331		0.380	
Sample size	4617		3925		4121		3464	

Table B6.1 continued

	3. Personal income				4. Life satisfaction			
	Males		Females		Males		Females	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Aged 25-34	0.784	0.050*	0.741	0.051*	-0.555	0.079*	-0.237	0.081*
Aged 35-44	0.967	0.051*	0.863	0.052*	-0.697	0.082*	-0.254	0.082*
Aged 45-54	0.957	0.053*	0.773	0.051*	-0.600	0.085*	-0.169	0.080*
Aged 55-64	0.950	0.063*	0.669	0.067*	-0.373	0.100*	-0.085	0.106
Degree	0.616	0.043*	0.554	0.042*	-0.211	0.070*	-0.260	0.066*
Other P-S	0.272	0.036*	0.258	0.039*	-0.149	0.057*	-0.239	0.061*
Comp H-S	0.382	0.05*	0.338	0.051*	-0.108	0.079	-0.229	0.080*
City	0.175	0.029*	0.121	0.031*	-0.157	0.048*	-0.215	0.049*
Disabled	-0.150	0.049*	-0.130	0.056*	-0.504	0.079*	-0.768	0.089*
Couple	0.022	0.041	-0.020	0.042	0.758	0.066*	0.443	0.066*
Sole parent	0.012	0.108	0.076	0.073	-0.150	0.170	-0.592	0.116*
Couple parents	0.115	0.056*	-0.190	0.063*	0.557	0.090*	0.070	0.101
No. dep <15	-0.050	0.021*	-0.080	0.025*	0.006	0.034	0.058	0.040
No. dep 15-24	-0.190	0.038*	-0.050	0.037	0.107	0.060	0.081	0.059
ATSI	-0.190	0.115	-0.020	0.105	0.459	0.190*	-0.283	0.172
ESB Immigrant	0.092	0.116	-0.070	0.134	0.098	0.185	-0.030	0.213
NESB Immigrant	-0.450	0.107*	-0.350	0.119*	-0.014	0.160	0.054	0.178
Poor English	-0.150	0.151	-0.210	0.179	-0.124	0.231	-0.892	0.258*
YSM	-0.010	0.010	0.004	0.012	-0.004	0.017	0.015	0.019
YSM2	0.001	0.002	5.08E-04	0.002	9.50E-04	0.003	-0.004	0.004
YSM-NESB	0.040	0.015*	0.020	0.016	-0.008	0.023	-0.038	0.026
YSM2-NESB	-0.010	0.003*	-0.004	0.003	0.003	0.005	0.009	0.005
Constant	9.418	0.053*	9.414	0.058*	8.213	0.085*	8.299	0.090*
R-squared	0.404		0.384		0.083		0.091	
Sample size	4363		3772		4775		4186	

Table B6.2: Males

	1. Personal income				2. Wage rate				3. Job satisfaction			
	(A)		(B)		(A)		(B)		(A)		(B)	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Aged 25-34	0.752	0.050*	0.694	0.050*	0.273	0.029*	0.227	0.027*	-0.275	0.106*	-0.319	0.108*
Aged 35-44	0.937	0.052*	0.857	0.052*	0.372	0.030*	0.296	0.029*	-0.367	0.109*	-0.421	0.113*
Aged 45-54	0.917	0.053*	0.824	0.055*	0.354	0.031*	0.256	0.031*	-0.088	0.112	-0.152	0.119
Aged 55-64	0.967	0.063*	0.862	0.066*	0.316	0.038*	0.218	0.038*	0.199	0.132	0.078	0.143
Degree	0.618	0.043*	0.481	0.050*	0.439	0.025*	0.301	0.029*	-0.249	0.090*	-0.367	0.107*
Other P-S	0.270	0.036*	0.234	0.037*	0.142	0.021*	0.098	0.021*	-0.239	0.075*	-0.283	0.079*
Comp H-S	0.387	0.050*	0.348	0.049*	0.183	0.029*	0.151	0.028*	-0.238	0.105*	-0.251	0.106*
City	0.180	0.029*	0.109	0.030*	0.128	0.017*	0.079	0.017*	-0.242	0.062*	-0.224	0.065*
Disabled	-0.120	0.051*	-0.070	0.050	-0.116	0.031*	-0.090	0.030*	-0.327	0.107*	-0.328	0.107*
Couple	0.016	0.041	0.006	0.040	0.099	0.024*	0.088	0.022*	0.143	0.086	0.137	0.086
Sole parent	0.047	0.113	0.063	0.111	0.006	0.066	0.022	0.062	-0.119	0.234	-0.054	0.234
Couple parents	0.132	0.055*	0.110	0.054*	0.107	0.032*	0.095	0.031*	-0.070	0.117	-0.072	0.117
No. dep <15	-0.050	0.021*	-0.050	0.020*	-0.013	0.012	-0.010	0.011	0.113	0.044*	0.101	0.044*
No. dep 15-24	-0.150	0.037*	-0.130	0.037*	-0.006	0.022	0.003	0.021	0.120	0.077	0.123	0.078
ATSI	-0.200	0.127	-0.190	0.124	-0.043	0.072	-0.010	0.068	0.798	0.277*	0.875	0.277*
ESB Immigrant	0.064	0.114	0.137	0.111	0.065	0.067	0.130	0.063*	0.106	0.242	0.132	0.242
NESB Immigrant	-0.420	0.111*	-0.330	0.109*	-0.156	0.059*	-0.070	0.056	-0.265	0.219	-0.187	0.219
Poor English	-0.090	0.165	-0.070	0.160	-0.113	0.086	-0.080	0.081	-0.246	0.328	-0.225	0.328
YSM	-0.003	0.010	-0.010	0.010	3.71E-04	0.006	-0.002	0.006	-0.018	0.022	-0.019	0.022
YSM2	4.43E-04	0.002	0.001	0.002	-2.85E-04	0.001	6.30E-05	0.001	0.004	0.004	0.005	0.004
YSM-NESB	0.035	0.015*	0.035	0.014*	0.012	0.008	0.009	0.008	0.036	0.030	0.037	0.030
YSM2-NESB	-0.010	0.003*	-0.010	0.003*	-0.002	0.002	-0.001	0.002	-0.006	0.006	-0.006	0.006
Constant	9.425	0.054*	9.138	0.081*	2.286	0.031*	2.060	0.047*	8.016	0.113*	7.951	0.173*
R-squared	0.359		0.398		0.229		0.327		0.036		0.050	
Sample size	4058		4057		3724		3723		4423		4422	

Table B6.2 continued: – Males

	1. Personal income (B)		2. Wage rate (B)		3. Job satisfaction (B)	
	Coef.	SE	Coef.	SE	Coef..	SE
Tenure	0.007	0.002*	0.006	0.001*	0.002	0.004
Indaccom	0.139	0.091	0.068	0.053	-0.297	0.194
Indcommun	0.252	0.103*	0.327	0.059*	-0.600	0.219*
Indconstr	0.281	0.072*	0.260	0.044*	0.057	0.152
Indcultrec	0.022	0.096	0.011	0.058	0.159	0.209
Indeduc	0.050	0.089	0.041	0.052	0.027	0.191
Indelec	0.265	0.127*	0.333	0.071*	-0.207	0.276
Indfinance	0.501	0.100*	0.491	0.058*	0.077	0.217
Indgovdef	0.199	0.086*	0.222	0.050*	-0.021	0.187
Indhlthcs	0.100	0.091	0.164	0.054*	-0.137	0.198
Indmanuf	0.245	0.068*	0.209	0.041*	-0.127	0.145
Indmining	0.555	0.107*	0.549	0.060*	-0.210	0.229
Indperserv	0.077	0.091	0.051	0.055	0.473	0.198*
Indpropbus	0.351	0.074*	0.282	0.045*	-0.158	0.158
Indrtrade	0.048	0.073	0.002	0.044	-0.198	0.155
Indtrans	0.351	0.080*	0.224	0.048*	0.049	0.172
Indwstrade	0.213	0.084*	0.112	0.049*	-0.284	0.180
Occmgr	0.336	0.063*	0.246	0.037*	0.406	0.135*
Occprof	0.308	0.061*	0.250	0.035*	0.337	0.133*
Occasprof	0.228	0.062*	0.156	0.035*	0.242	0.134
Occadvclerk	0.077	0.169	-0.070	0.097	0.757	0.372*
Occintclerk	0.178	0.063*	0.123	0.035*	0.001	0.137
Occelemclerk	-0.100	0.073	-0.040	0.040	0.144	0.156
Octrade	0.104	0.055	0.088	0.031*	0.294	0.118*
Occintprod	0.156	0.058*	0.034	0.032	0.232	0.125
Union	0.128	0.032*	0.099	0.018*	-0.151	0.070*
Self employed	-0.270	0.038*	-0.190	0.025*	0.012	0.081

Table B6.2 continued: – Females

	1. Personal income				2. Wage rate				3. Job satisfaction			
	(A)		(B)		(A)		(B)		(A)		(B)	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Aged 25-34	0.692	0.051*	0.621	0.051*	0.297	0.028*	0.237	0.027*	0.106	0.109	0.047	0.111
Aged 35-44	0.805	0.052*	0.702	0.053*	0.332	0.028*	0.258	0.028*	0.133	0.111	0.045	0.114
Aged 45-54	0.728	0.052*	0.595	0.054*	0.315	0.028*	0.220	0.029*	0.247	0.110*	0.135	0.117
Aged 55-64	0.631	0.067*	0.473	0.071*	0.312	0.037*	0.195	0.039*	0.584	0.141*	0.473	0.153*
Degree	0.549	0.041*	0.380	0.051*	0.411	0.023*	0.215	0.028*	-0.505	0.088*	-0.694	0.109*
Other P-S	0.259	0.039*	0.210	0.040*	0.144	0.022*	0.086	0.022*	-0.191	0.082*	-0.285	0.085*
Comp H-S	0.328	0.050*	0.288	0.050*	0.164	0.028*	0.119	0.027*	-0.340	0.107*	-0.349	0.108*
City	0.123	0.031*	0.087	0.031*	0.081	0.017*	0.066	0.017*	-0.196	0.065*	-0.228	0.067*
Disabled	-0.130	0.057*	-0.110	0.056*	-0.046	0.033	-0.030	0.032	-0.428	0.120*	-0.453	0.120*
Couple	-0.020	0.041	-0.020	0.040	0.046	0.023*	0.030	0.022	0.131	0.089	0.109	0.088
Sole parent	0.094	0.074	0.103	0.072	-0.046	0.041	-0.050	0.039	0.106	0.159	0.095	0.158
Couple parents	-0.170	0.063*	-0.170	0.062*	0.055	0.035	0.033	0.034	0.263	0.135	0.239	0.134
No. dep <15	-0.080	0.025*	-0.080	0.025*	-0.009	0.014	-0.010	0.013	0.020	0.053	0.014	0.053
No. dep 15-24	-0.050	0.037	-0.050	0.036	-0.031	0.020	-0.030	0.020	4.38E-04	0.079	-0.005	0.079
ATSI	-0.150	0.113	-0.150	0.112	0.073	0.066	0.070	0.063	0.335	0.252	0.287	0.251
ESB Immigrant	-0.020	0.135	0.012	0.133	0.004	0.075	0.036	0.072	-0.013	0.292	0.077	0.292
NESB Immigrant	-0.370	0.120*	-0.270	0.118*	-0.183	0.062*	-0.110	0.060	-0.286	0.243	-0.199	0.243
Poor English	-0.130	0.183	-0.090	0.182	-0.277	0.097*	-0.210	0.094*	-0.658	0.368	-0.495	0.371
YSM	0.003	0.012	3.01E-04	0.012	0.005	0.007	0.003	0.007	0.002	0.026	-0.006	0.026
YSM2	4.17E-04	0.002	9.29E-04	0.002	-0.002	0.001*	-0.001	0.001	-0.002	0.005	-9.77E-04	0.005
YSM-NESB	0.023	0.016	0.022	0.016	0.007	0.009	0.007	0.009	0.015	0.035	0.019	0.035
YSM2-NESB	-0.004	0.003	-0.004	0.003	1.94E-04	0.002	-1.68E-05	0.002	-0.001	0.007	-0.002	0.007
Constant	9.452	0.058*	9.21	0.110*	2.247	0.031*	2.090	0.067*	7.824	0.122*	7.318	0.229*
R-squared	0.349		0.380		0.205		0.273		0.041		0.061	
Sample size	3561		3560		3443		3442		3927		3926	

Table B6.2 continued: Employed persons – Females continued

	1. Personal income (B)		2. Wage rate (B)		3. Job satisfaction (B)	
	Coef.	SE	Coef.	SE	Coef.	SE
Tenure	0.014	0.002*	0.005	0.001*	0.004	0.005
Indaccom	0.046	0.105	0.005	0.065	0.069	0.218
Indcommun	0.344	0.143*	0.195	0.083*	0.166	0.304
Indconstr	0.218	0.133	0.131	0.082	0.248	0.273
Indcultrec	0.103	0.120	-0.030	0.073	0.383	0.252
Indeduc	-0.040	0.099	0.008	0.062	0.611	0.206*
Indelec	0.218	0.331	0.116	0.180	-0.666	0.702
Indfinance	0.226	0.113*	0.137	0.069*	0.025	0.238
Indgovdef	0.037	0.115	0.124	0.070	0.583	0.243*
Indhlthcs	0.105	0.095	0.015	0.060	0.618	0.197*
Indmanuf	0.164	0.103	0.088	0.065	0.455	0.214*
Indmining	0.414	0.258	0.246	0.153	0.536	0.540
Indperserv	-0.050	0.114	-0.070	0.070	0.512	0.238*
Indpropbus	0.198	0.097*	0.103	0.062	0.205	0.201
Indrtrade	-0.002	0.097	-0.060	0.061	0.162	0.200
Indtrans	0.280	0.129*	0.153	0.077*	0.506	0.269
Indwstrade	0.116	0.120	0.145	0.073*	0.265	0.253
Occmgr	0.499	0.090*	0.457	0.053*	0.505	0.191*
Occprof	0.333	0.073*	0.357	0.040*	0.450	0.158*
Occasprof	0.248	0.072*	0.216	0.040*	0.436	0.156*
Occadvclerk	0.289	0.082*	0.300	0.045*	0.737	0.176*
Occintclerk	0.116	0.065	0.092	0.035*	0.287	0.140*
Occelemclerk	0.063	0.073	0.069	0.040	0.343	0.158*
Octrade	0.147	0.099	0.062	0.056	0.298	0.214
Occintprod	0.047	0.106	-0.030	0.059	0.411	0.229
Union	0.090	0.036*	0.070	0.019*	-0.322	0.078*
Self employed	-0.290	0.052*	-0.010	0.033	-0.011	0.108