

*Final report*

## **Dynamics of household joblessness in Australia 2001-2007**

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## Executive Summary

This project investigates the dynamics of household joblessness in Australia using the Household Income and Labour Dynamics in Australia (HILDA) Survey, Waves 1 to 7. Previous work by the Melbourne Institute (Headey and Verick, 2006) is used as the starting point. It is different from the recently published Whiteford (2009) report in that this report's focus is broader than families with children and the analysis is multivariate. It aims to estimate the effect of potential factors while controlling for the effects of a broad range of other factors. In addition, it applies a dynamic model allowing for persistence in joblessness from year to year and controlling for individual-specific effects. Finally, the focus of most analyses in this report is on the individual and his or her probability of being a member of a jobless household. This report is different from any unpublished DEEWR reports using Centrelink Administrative data, the Research and Evaluation Database (RED).<sup>1</sup> While the seven waves of HILDA inform on a variety of jobless households from a large sample survey, RED represents the total income support population including a demographic profile of all jobless families within this population.

### *The approach*

This report uses a combination of descriptive univariate and multivariate analyses to examine the extent and persistence of household joblessness. In addition, as mentioned above, panel data methodology is used to investigate what factors, in addition to being in a jobless household in the previous period, affect the current state of household joblessness of an individual. Although the issue of interest is household joblessness, all analyses are done at the individual level so that changes in household composition, as might occur through partnering or divorce, can be taken into account.

In the analyses, we use different definitions of household joblessness. The central definition states that a household is jobless if all members of the household are jobless. Three alternative variables are used to determine an individual's joblessness. First, the calendar variable in the HILDA indicating how much time an individual was in employment is used. If someone is in employment for less than 50 per cent of the reported time in the previous year, the person is counted as a jobless person. It is found that using 40 per cent or 60 per cent instead of 50 per cent does not change the extent of joblessness much. The second, alternative, variable used is the current labour force status. An individual is counted as jobless if he/she is currently non-employed. Again this results in very similar rates of joblessness. Finally, variables from the household questionnaire are used to determine the joblessness of each household member as reported by one household member (the reference person). This increases the number of individuals who can be included in the analysis. Using this definition, a lower household

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<sup>1</sup> This information was provided by Margaret Wada from the Department of Education, Employment and Workplace Relations.

joblessness rate is found for all types of households. This could be due to measurement error (since the reference household member may know less about each person's employment than they do themselves). Alternatively, it could be due to the non-respondents, who are now included in our calculations, being more likely to be in a job than those who responded to the survey.

In the multivariate analyses, we use the first definition (based on the 50 per cent cut-off point) and the third definition (which in the remainder of the Executive Summary, we call the second definition). The results based on the two definitions are somewhat different, although the direction and importance of effects are quite similar between the two approaches.

### ***The main findings***

From all descriptive analyses, single persons are found to be more at risk than other groups. On average 47 per cent live in a jobless household in any year and only 38 per cent are never in a jobless household for the seven years observed. However, the jobless group of singles consists mostly of retired persons (over the Age Pension age). Once this group is excluded from the analysis, we find that individuals living in lone parent families (mostly mothers) are most at risk of household joblessness: 34 per cent are in a jobless household in any year compared to only 5 per cent of individuals living in couple families and 16 per cent of single persons. 50 per cent of individuals in lone parent families are in a jobless household in at least one of the seven years compared to only 13 per cent of individuals living in couple families and 22 per cent of single persons. There are a large number of individuals and household characteristics which are correlated with the incidence and persistence of household joblessness. For example, as expected, retirement of the individual is associated with household joblessness. Nearly 55 per cent of retired individuals live in a jobless household in any year. Only 4 per cent of individuals living in a household where the reference person is retired are never part of a jobless household. We also find that health problems (both mental and physical health) contribute to household joblessness. Of those with good mental health only 5 per cent live in a jobless household in any year and of those with poor mental health nearly 18 per cent live in a jobless household in any year. Similarly, in any year, those with a long-term health condition or a work-limiting health condition are much more likely to live in a jobless household (23 and 28 per cent respectively) than the average person (at only 10 per cent). Over a seven-year period, of those with poor mental health about 30 per cent have lived in a jobless household for at least one year. Comparable percentages for those with good mental health, a long-term health condition or a work-limiting health condition are 11 per cent, 32 per cent and 40 per cent respectively. The number of preschool children tends to increase the incidence and persistence of household joblessness, whereas the number of all children decreases both incidence and persistence. Individuals in families with preschoolers are somewhat more likely to live in a jobless household in any year (13 per cent) than individuals in families without children (9 per cent), whereas only 8 per cent of individuals in

families with children but no preschoolers live in a jobless household in any year. Similarly, 22 per cent of individuals in families with preschoolers lived in a jobless household for at least one of the seven years compared to 16 per cent of individuals in families without children and 18 per cent of individuals in families with children but no preschoolers. Finally, for all groups the risk of household joblessness decreased between 2001 and 2007, even for older (such as those over the Age Pension age) and retired individuals. On average, amongst working age individuals nearly 12 per cent lived in a jobless household in 2001 against just over 8 per cent in 2007.

However, the effect of other factors is less clear-cut. For example, education seems to affect the incidence of household joblessness but not so much the persistence of household joblessness. The effect of work experience is mixed, and the proportion of time not in work appears more important in predicting household joblessness than the proportion of time in unemployment. Being a full-time student also has ambiguous effects on household joblessness. In some cases, these effects are in different directions for men and women. Age has a clear effect on the incidence of household joblessness, first it decreases with age and after a certain age (about 50 for women and just over 30 for men) it increases with age. However, there is no clear effect of age on the persistence of household joblessness.

The results from the dynamic random effects probit model are relatively straightforward to interpret. State dependence is found to be important for men and women for both definitions of joblessness. All else being equal, being in a jobless household in the previous year increases the probability of household joblessness in the current year by 24.0 and 21.1 percentage points for females and males respectively, under the first joblessness definition, and by 16.7 and 12.9 percentage points under the second definition. In addition, unobserved differences between individuals and a range of observed factors are found to affect the probability of household joblessness.

Health and level of educational attainment are both found to be important factors, with bad health and low levels of educational attainment both contributing to the probability of an individual being in a jobless household. Any education level above Year 9 reduces the probability of household joblessness, with the largest effects (of about 6 percentage points for women and 4 percentage points for men) being associated with a university degree.

The youngest and oldest females are more at risk of being in a jobless household than the group in the middle. For men, the risk of household joblessness is lowest for those between 18 and 29 years of age and highest for those over 60 years of age. The difference between these two age groups is about 6 to 8 percentage points.

Women living outside of a major city are more at risk of household joblessness (by 1.2 to 1.4 percentage points), as are both men and women living in low SEIFA areas. To some extent, these factors could be caused by the joblessness rather than the other way around.

Different household types are associated with different risks of joblessness. For women, being a single parent is associated with the highest probability of living in a jobless household (about 9 percentage points higher than for women living in couple families), whereas this effect is only significant for men under the second definition and much smaller than for women (just over 2 percentage points higher than for men living in couple families). The next highest risk is experienced by multi-family households and lone person households for women, who have a probability of living in a jobless household which is about 7 to 9 percentage points higher than women in couple families. For men, these two groups are at the highest risk of household joblessness (about 3 to 6 percentage points higher than men in couple families). The results indicate that the effects of household type are clearly larger for females than for males.

Households with young children are more at risk of joblessness than other households but households with older children are less at risk of joblessness. Again, these effects are larger for females than for males. For females, an additional child under five years old increases the probability of household joblessness by about 4 percentage points, whereas the corresponding effects are just under 2 percentage points for males.

Women with a partner are less at risk of being in a jobless household (4 to 6 percentage points lower than single women), whereas for men, having a partner has much less (2 percentage points) to no effect.

Retired individuals and individuals who are full-time students have significantly higher probabilities of being in a jobless household. In addition, being retired was found to have a slightly larger impact on the probability of household joblessness for males than for females.

# 1. Introduction

This project investigates the dynamics of household joblessness in Australia using the Household Income and Labour Dynamics in Australia (HILDA) Survey, Waves 1 to 7. Previous work by the Melbourne Institute (Headey and Verick, 2006) is used as the starting point in order to develop the analysis of Jobless Households in two main research directions, both aimed at informing policy, in particular policy related to the Social Inclusion of disadvantaged households. This study is different from the recently published Whiteford (2009) report in that this report's focus is broader than families with children and the analysis is multivariate. It aims to estimate the effect of potential factors while controlling for the effects of a broad range of other factors. In addition, it applies a dynamic model allowing for persistence in joblessness from year to year while controlling for individual-specific effects. Finally, the focus of most analyses in this report is on the individual and his or her probability of being a member of a jobless household. This report is different from any unpublished DEEWR reports using Centrelink Administrative data, the Research and Evaluation Database (RED).<sup>2</sup> While the seven waves of HILDA inform on a variety of jobless households from a large sample survey, RED represents the total income support population including a demographic profile of all jobless families within this population.

First, we use the first seven waves of HILDA (2001-2007) in order to update the descriptive analyses of the incidence and persistence of Jobless Households over 3 waves presented by Headey and Verick (2006). We extend the descriptive analyses by introducing alternative definitions of household joblessness. In an additional univariate analysis, we summarise the proportion of household joblessness and the persistence of joblessness by a range of individual and household characteristics. This provides a broader range of dimensions in which we examine joblessness. We also include multivariate analyses of year-by-year joblessness and persistence of joblessness which identify the factors that are important in determining joblessness whilst controlling for a wide variety of other possible factors. It can be expected that many of the factors associated with joblessness are themselves correlated with each other as well.

Second, we investigate the issue of household joblessness state dependence; that is the 'stickiness' of household joblessness as an employment status that may persist over time in a self-perpetuating manner. The availability of seven HILDA waves enables the use of appropriate econometric methodology which allows us to go beyond the presentation and discussion of descriptive (two-way or multivariate) associations, and possibly estimate causal relationships regarding the factors that lead to joblessness. It should be noted that the results from this second section are considerably more informative for policy purposes, but is also

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<sup>2</sup> This information was provided by Margaret Wada from the Department of Education, Employment and Workplace Relations.

considerably more dependent on the suitability of the data to reveal such relationships if they are present.

The multivariate analysis is restricted to individuals below Age Pension age (and their children) in order to avoid confusing joblessness with retirement issues, since by the time individuals are over 65 years of age, the majority has left the labour force.

The structure of the report is as follows. A literature review, focussing on Australian evidence, is presented in Section 2. The selection of the sample and definition of the key variables are discussed in Section 3 on the data. Section 4 reports a range of summary statistics, replicating some of the research done by Headey and Verick (2006), and presenting the distribution of household joblessness and the persistence of household joblessness over time by household and individual characteristics. Further descriptive analyses are reported in Section 5, which includes a random effects probit model explaining household joblessness and an ordered probit model explaining the persistence of household joblessness. The effect of individual factors can thus be assessed while controlling for the effects of a wide range of other important characteristics. Finally, Section 6 discusses the results of a multivariate dynamic random effects probit model for household joblessness of individuals. The analyses aim to separate state dependence from persistent individual unobserved heterogeneity.

## 2. A Brief Literature Overview

We commence our overview of studies on joblessness with the Australian study which is taken as the starting point for this report. Based on the first three waves of the HILDA, Headey and Verick (2006) examine the persistence and determinants of joblessness, using for the first time longitudinal data instead of cross-sectional snapshots. They define household joblessness as no member working for 26 weeks or more in the last financial year. The report finds that “for some types of household - especially lone parent and lone person households - joblessness is indeed persistent. However, for other types of household (especially couple households), joblessness is usually a transient or short term experience.” Examining the entries and exits from household joblessness, the report finds that “the longer a household remains jobless, the worse are its chances of ‘exiting’ that state.” Moreover, “household which have previously been jobless are at greater risk than average of returning to joblessness in a subsequent period.” The multivariate analysis shows that, after controlling for many other variables, single mother households and lone person households are more likely to be jobless than other groups. Other factors increasing the risk of joblessness are disability, inadequate English and, to a lesser extent, poor formal education.

In the late 1990s, Miller (1997) already pointed out the problem of household joblessness in Australia. The study revealed that “almost one-quarter of the total unemployment among couple families in 1994 was in families where both husband and wife were unemployed.” Based on the Labour Force Survey and the 1991 Census of Population and Housing, the study also shows that similar levels of male unemployment can be associated with different levels of household joblessness. This was an indication of the increasing polarisation of jobs in Australia, later documented by Dawkins *et al.* (2002).

The Australian descriptive study by Dawkins *et al.* (2002) focuses on the period from 1982 to 1997-98 using the Income Distribution Surveys and the Surveys of Income and Housing Costs.<sup>3</sup> They study joblessness of the working-age population (which is defined as 15-64 year old males and 15-59 year old females). A jobless household is defined as a household where no working-age adult is in paid employment. They show that “while individual-based measures of joblessness fell after the highs in the early 1980s and have remained fairly stable over the last 10 years or so, household measures of joblessness have risen.” This is along the lines of the multi-country study by Gregg *et al.* (2004) and it reveals a polarisation of jobs across households. What is striking in the Australian case is the large proportion of children living in jobless households (one in six in 1997-98).<sup>4</sup> The decomposition shows that the

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<sup>3</sup> These two surveys are basically based on the same set of questions. In the earlier years, the surveys were named Income Distribution Survey. In 1990, the survey was renamed to Survey of Income and Housing Costs.

<sup>4</sup> This point is also raised by McNamara *et al.* (2008) in a study on the social exclusion of Australian children based on data from the 2001 and 2006 Censuses of Population and Housing. They note “that, even by 2006, a relatively large proportion of children are living in jobless families, [which] is concerning, especially given Australia’s currently low unemployment rates.”

increase in the number of jobless households is only partly explained by the growing number of single adult households. In the opinion of the authors, “the fact that there are more jobless households of all types, except couples without children, while employment levels were rising suggests that there is also a broader labour market problem.”

Employment polarisation in Australia is further documented in a study by Dawkins *et al.* (2005), based on the same data as Dawkins *et al.* (2002) but with the addition of the 2000/01 Income and Housing Costs Survey. Again, a jobless, or non-working, household is defined as a household where no working-age adult is in paid employment. Labour force status classifications used in ABS statistics correspond to those set out by the International Labour Organisation (ILO) and the United Nations Statistical Office. The main finding is that employment has become more polarised across households, especially within household types, and that changes in household size only explain part of the story. “Indeed, a large majority of the polarisation of employment within-household types is found within two-adult (couple) households and is especially marked among those with children.”

Using data from the first wave of the Household, Income and Labour Dynamics Survey in Australia (HILDA) Survey, Scutella and Wooden (2004) examine the incidence, characteristics and financial consequences of household joblessness. A jobless household is defined as a household where no adult is in paid work. An adult is defined as anyone of working age (15 to 64 years of age) but the authors exclude full-time students. They find that “the likelihood of living in a jobless household rises with age and falls with educational attainment, is relatively more pronounced for people without any children or people with large numbers of children (4 or more), and is more common among women, immigrants from a non-English-speaking background, persons living in regional Australia, and people living in public housing. There is also strong evidence of jobless households clustering together in neighbourhoods that score lowest on derived scales of socio-economic disadvantage.” They also find that relative poverty, subjective measures of financial stress and lower levels of financial wellbeing are more prevalent in jobless households.

The most recent Australian study is by Whiteford (2009). It is based on three sources of data: (i) the Labour Force Status and Other Characteristics of Families publication (ABS Cat. No. 6244.0), which is part of the Labour Force Survey, (ii) the Labour Force Experience publication (ABS Cat. No. 6206.0), and (iii) the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The recent trend in joblessness is consistent across these three data sources. That is, “following nearly two decades of increasing joblessness, family joblessness has fallen since 1998 and is now nearly back to its level in 1980”. Note that in this study families refer to people with dependent children only. The conclusion drawn from the longitudinal analysis based on the HILDA is that “the experience of joblessness is more common than suggested by point-in-time data, but that long-term joblessness is concentrated on a smaller group of families at risk of severe disadvantage. For example, between 2001 and

2005 the proportion of children living in jobless households fell from around 18 per cent to 14 per cent, but nearly 26 per cent of children experienced a spell of joblessness in at least one of those five years, but only 5.5 per cent of children were in jobless households for all five years.” Considering the link between joblessness and child poverty, Whiteford (2009) finds that Australia distinguishes itself from other OECD countries because a high proportion of poor children (70 per cent) live in jobless families, “making the joblessness of parents the main cause of relative low income in childhood.”

Gregg and Wadsworth (2004) examine the evolution of joblessness at the individual and household level in the UK between 1975 and 2003. Their descriptive study uses the International Labour Organisation (ILO) definition of work for working-age individuals (that is, men aged 16-64 and women aged 16-59).<sup>5</sup> Over this period, they find that individual joblessness remains broadly in line with the economic cycle while the share of jobless households triples. The data show that “by 1996, nearly one in five of all (working-age) households were jobless and one in every seven individuals lived in a workless household, up from one in twenty in 1975.” The study points out the polarisation of jobs within rather than between household types. The authors stress that “individual and household based aggregate measures of joblessness can, and do, offer conflicting signals about labour market performance”. These differences arise because of the uneven and changing distribution of jobless individuals across households.

Also based on UK data, the study by Nickell (2004) emphasises the high correlation between household joblessness and poverty, especially child poverty. Joblessness is not explicitly defined in this study, which is based on descriptive analyses. Nickell notes that around 70 per cent of all individuals living in jobless households live in single-adult households. The apparent contradiction between the evolution of individual and household joblessness pointed out by Gregg and Wadsworth (2000) is explained by the increase in female participation among married women, whose partners are typically working, in combination with the fall in participation of single women with children and the increase in the proportion of single-parent households.

Gregg *et al.* (2004) find similar patterns in household joblessness in a comparison of five OECD countries: United States, Britain, Germany, Spain and Australia. The conclusion is that “there has been a growing disparity between the individual- and household-based workless measures.” In all five countries, “individual workless rates have fallen over the past twenty years but household-based workless rates have not.” The decomposition of historical changes shows that “most of the discrepancies between the individual and household workless counts stem from within household factors, rather than from changing household composition.” The study also reveals a few patterns specific to both Britain and Australia. That is, “non-

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<sup>5</sup> The definition of work is quite elaborate: see <http://laborsta.ilo.org/applv8/data/c2e.html> .

employment in Britain and Australia is more concentrated on single adults and families with children, than in other countries.” In addition, “Britain and Australia’s high polarisation rates stem primarily from an “excess” of joblessness among single-adult households, that is absent in other countries.”

As Scutella and Wooden (2008) found in a study focusing on the effects of household joblessness on mental health based on the HILDA, there may be further consequences arising from unemployment. They observed that unemployment is associated with lower levels of mental health, however “no evidence [...] can be found for any additional disadvantage to the unemployed stemming from living in a jobless household.” Similar correlations of bad health and mental health (and lower life satisfaction) with joblessness were also found by Headey and Verick (2006). The latter researchers also found strong correlations with (re-)partnering, divorce, income poverty, income support dependency and financial stress, indicating a variety of potential consequences from joblessness.

These studies all reveal an increase in the proportion of jobless households in recent years, even while the proportion of jobless individuals decreases. In addition, children seem relatively more affected in Australia (and the UK) than in some other countries. This report aims to investigate the persistence of joblessness and the potential reasons for this persistence. To achieve this, the descriptive analyses in Section 4 and 5 are complemented by multivariate analysis of the dynamics of joblessness. In contrast to other studies, this report also explores the sensitivity to alternative definitions of joblessness. The UK studies were mostly based on a snapshot type definition of joblessness at one point in time.

### 3. The Data

The analysis in this report is based on the first seven waves of the HILDA data set. HILDA is a longitudinal data set collecting information on all individuals for a number of randomly selected households on a yearly basis. HILDA collects information on a large number of individual characteristics, such as education, health, labour force participation and income, and household characteristics, such as the number and age of children, and the number and a range of characteristics of other adults living in the household.<sup>6</sup>

Given our interest in the degree of joblessness, we limit the sample of analysis to respondents who can be expected to work: that is only those of working age (between 18 and 64 years old) are selected. For some of the descriptive analyses, we also exclude the age-groups that are likely to be full-time students (aged between 18 and 21 years of age) or to be retired (aged 55 or over). In the multivariate analyses, all respondents over 18 are included for each wave in which they are not of Age Pension age, and for as long as not all members of the household are retired or full-time students.

The sample weights are used to compute the descriptive statistics. For cross-sectional statistics, we have used the enumerated person population weights (variable *hhwte*). For longitudinal statistics we have used the enumerated person weights for a balanced panel from waves 1 to 7 (variable *wlea\_g*).

The analysis is based on a number of variable definitions which are described below.

*Jobless person:* Any respondent of 18 years or over who worked less than 50 per cent of the weeks in the previous financial year (that is, time in unemployment together with time out of the labour force is more than 50 per cent of total time) is defined as being jobless.<sup>7</sup> This definition has to be qualified because of the way it has been generated. We use the HILDA survey employment calendar in which all interview respondents are asked to state their weekly employment history for the year before the date of their interview. This reporting should ideally be for 52 weeks, but is rarely that, as the calendar was only answered up to the period of the interview date. HILDA interviews are usually held in the period between August and the end of the year. The number of completed weeks in the employment calendar is often well below the maximum mark of 52 weeks. This presents us with problems of defining joblessness in this manner. To overcome this problem we use a number of derived variables, provided by HILDA, which state the percentage of reported time spent in employment, study, looking for a job, and other activities.<sup>8</sup> To be defined as jobless, the variable ‘capj’

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<sup>6</sup> Detailed information on HILDA can be found on the website <http://melbourneinstitute.com/hilda/>

<sup>7</sup> Tables 4.1 and 4.2 in Section 4 show the proportions of jobless individuals using a 40 per cent and a 60 per cent cut-off point respectively instead of the proposed 50 per cent. The tables reveal a limited sensitivity of the results to the alternative cut-off points.

<sup>8</sup> To the degree that non-reporting in the employment calendar is associated with the level of joblessness (a premise that we cannot test), this measure of joblessness will be biased.

(percentage of time in employment) needs to have a value under 50. This is called definition 1 in the later sections of this report.

In an alternative definition (to be called definition 1a), we use information based on the current situation (that is at the time of the interview), the variable ‘esdtl’ (current labour force status) is used. A person is defined as jobless if the variable ‘esdtl’ is more than 2 (that is, unemployed or out of the labour force during the last four weeks).

In another alternative definition (to be called definition 2), we use information from the household questionnaire, in which one household member provides information about the employment status of all other household members. A person is defined as jobless if the variable ‘hges’ is more than 2 (that is, not working full time or part time). For the year 2002, where this variable is absent in the household questionnaire, we use imputed employment status instead: a person is defined as jobless if the variable ‘hgebi’ is more than 1 (that is, the imputed status is “not working” or “unemployed”).

*Jobless household:* This is a household in which all members over 18 are jobless in accordance with the definition of a jobless person. The joblessness of households that include working age members for whom it is not possible to determine the personal joblessness or employment status, have been categorised as “household joblessness not determined” and they are excluded from further analysis.

*Working-age or younger person:* For cross-sectional calculations, we include all males aged 64 years or younger and all females aged 62 or 61 years or younger in the analysis.<sup>9</sup> For all longitudinal descriptive calculations, we only include males aged 64 years or younger and all females aged 62 years or younger in all seven waves of the analysis, which is equivalent to limiting the age of the sample in the year 2001 to 57 or younger for males and 54 or younger for females.<sup>10</sup>

*Employment status:* We have excluded from some of the descriptive analyses households that are headed by a full-time student. In the cross-section calculations this is limited to the year in question, but in the longitudinal calculations this was extended to being a student in any year between 2001 and 2007

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<sup>9</sup> The exact age for women depends on the year of observation as the Age Pension age for women is being slowly increased over time to match that of men in a few years time.

<sup>10</sup> We create some alternative statistics for the age group just under Age Pension age who are excluded from the standard longitudinal analysis.

## 4. Descriptive Summary Statistics

This section discusses a wide range of summary statistics in relation to household joblessness. In Section 4.1, we discuss a comparison of our updated results based on the HILDA with the results from the three waves of HILDA that Headey and Verick (2006) used. The incidence or prevalence and persistence of household joblessness are discussed in Section 4.2 and the number of children affected by household joblessness in Section 4.3.

However, before going into the above, we first analyse the variable joblessness somewhat more in-depth. We have carried out a sensitivity analysis regarding the cut-off point used for defining joblessness (which is set at 50 per cent in the tabulations presented in Sections 4.1 to 4.3 and in the multivariate analyses in Sections 5 and 6). In addition, we use different variables from the HILDA survey to define joblessness in two alternative ways.

The above-mentioned alternative definitions of joblessness are explored in Tables 4.1 and 4.2. Table 4.1 shows that although the proportion of individuals in jobless households varies substantially by household type, the choice of the cut-off point in the calendar year to determine individual joblessness has no major effect. That is, the incidence of household joblessness does not vary much whether individuals are defined as jobless when they have worked for less than 40, 50 or 60 per cent of the year. In addition, Table 4.2 shows that the choice of the cut-off point has a negligible impact on persistence of household joblessness. This analysis suggests that the patterns in these tabulations remain unchanged and that the actual percentages are not very sensitive to the precise cut-off point used for the definition of joblessness.

**Table 4.1 Proportion of individuals in jobless households by household type and definition (in per cent)**

	Calendar: worked less than (Definition 1)			Current state (Definition 1a)	Household questionnaire (Definition 2)
	50%	40%	60%		
Couple	14.8	14.1	15.1	15.1	13.2
Lone parent	34.9	32.9	36.2	33.1	25.3
Related family	23.5	20.9	24.7	23.4	16.8
Lone person	48.1	46.9	49.0	48.3	46.5
Group	27.3	24.8	29.7	26.5	20.6
Multi-family	38.1	34.4	39.2	37.5	28.3
Total	22.0	21.0	22.6	22.1	18.8

Instead of the calendar variables, the current labour force status at the time of the interview can be used to determine the joblessness status. Tables 4.1 and 4.2 show that the occurrence

and persistence of household joblessness obtained with this alternative definition are very similar to the results obtained with the calendar variables.

**Table 4.2 Persistence of household joblessness by joblessness definition (in per cent)**

	Calendar: worked less than			Current state	Household questionnaire
	50%	40%	60%		
Never	53.9	55.3	53.2	53.6	69.9
1 year	5.2	4.5	5.3	5.3	6.0
2 years	2.8	2.8	2.9	2.9	3.5
3 years	2.3	1.8	2.3	2.2	2.4
4 years	1.9	1.9	1.9	2.0	2.4
5 year	1.6	1.8	1.8	2.0	2.0
6 years	2.7	2.4	2.7	2.4	2.7
7 years	11.6	11.3	11.8	11.7	10.9
not determined	18.1	18.1	18.1	18.1	0.2
No of observations	12,205	12,205	12,205	12,205	12,205

A problem with the current labour force status and the calendar variables, which are all recorded at the individual level, is that the number of missing values can be substantial. To circumvent this problem, it is possible to use information from the household questionnaire. In this questionnaire, one household member provides information about the employment status of all other household members. Tables 4.1 and 4.2 show that the use of this variable produces different results on the measures of both the occurrence and persistence of household joblessness. One possible explanation is that the household member filling out the household questionnaire is not always fully aware of the employment status of other household members. In addition, the data reveal that non-respondents to the HILDA survey are more likely to be working (according to the household questionnaire) than respondents. This explains why the incidence of household joblessness is lower when the definition is based on the household questionnaire. In the following multivariate analyses, we present results using both definitions.

#### **4.1 Comparison with Headey and Verick's results**

The cross-sectional results reported in this subsection can be compared directly across the two studies, but the longitudinal summary statistics measuring persistence are clearly not directly comparable due to the longer observation period in this report. As a result of the increased length of the period of risk, the proportion who experience no joblessness at all or one, two or three years of joblessness changes as well. The group who has never been jobless within the indicated time frame decreases as a result of the longer risk period. The cross-sectional results in this subsection are very similar to those reported by Headey and Verick (2006). In all tables, except for those based on prime-aged households, is the proportion in jobless households slightly lower in this report than in Headey and Verick's report.

The predominant patterns in Table 4.3 are that between the years 2001 and 2007 the percentage of individuals living in jobless households declined.<sup>11</sup> This is similar to the finding of Whiteford (2009) who explores this pattern, using three different data sets. From 2001 to 2007, unemployment steadily decreased and jobless families have clearly benefited from this improvement in the labour market.<sup>12</sup> In the period 2001-2007 there is a substantial group of persons living in persistently jobless households – however, many of them are near retirement age. In the multivariate analyses in Sections 5 and 6, we include self-reported retirement to examine the degree to which early retirement plays a role in persistent joblessness.

**Table 4.3: Proportion of individuals in jobless households: comparing cross-sectional and longitudinal results<sup>a</sup>**

Cross-sectional results	All persons	Working age or younger and not in retired hh	Persistence: years in jobless hh	All persons	Working age or younger and not in retired hh
	%	%		%	%
2001	22.2	12.4	Never	65.8	80.1
2002	22.3	12.6	1 year	6.2	6.2
2003	21.8	11.8	2 years	3.1	3.1
2004	21.8	11.6	3 years	2.7	2.6
2005	21.2	11.0	4 years	2.2	1.7
2006	20.5	10.3	5 years	1.8	1.1
2007	20.1	9.9	6 years	3.6	2.3
			7 years	14.6	2.8
				(100.0)	(100.0)

a) Source: Authors' own calculations based on HILDA waves 2001-07. Population-weighted results.

Table 4.4 shows that lone parent households are more at risk of joblessness than couple households. Importantly the differences are most pronounced in persistent joblessness. Given that there are issues regarding the validity of comparisons between households with one or more persons, it may be advisable to compare lone person household joblessness with lone person participation rates. As these are one-person households, these rates should be quite close. Comparing the column headed by “current state” (representing current labour force status) with the columns under “calendar” (where the 50 per cent column is the definition used in the tables in this section) in Table 4.1 shows these two definitions are indeed close. Using information from the household questionnaire lowers the rate of joblessness considerably for most groups except couples and lone persons. Nevertheless, Table 4.1 shows that lone parent households remain at considerably higher risk of joblessness irrespective of the definition for joblessness chosen.

<sup>11</sup> Group households and multi-family households are excluded from these tabulations.

<sup>12</sup> This has not always been the case. There have been periods of decreasing overall unemployment in Australia, when household joblessness increased because employment was not evenly distributed over households. That is, in some households multiple adults are in employment whereas in other households no one is employed. This skewed distribution appears to have improved between 2001 and 2007.

**Table 4.4: Prime-age groups (25-54) at high and low risk of joblessness: comparing cross-sectional and longitudinal results<sup>a</sup>**

<b>Cross-sectional results</b>	Lone parent households: parent %	Couple hhs: ref. person prime age %	<b>Persistence: years in jobless hh</b>	Lone parent Households: parent <sup>b</sup> %	Couple hhs: ref. person prime age <sup>b</sup> %
2001	35.4	5.2	Never	40.4	91.6
2002	37.0	4.4	1 year	7.4	3.8
2003	35.0	4.4	2 years	9.2	1.7
2004	33.9	3.8	3 years	8.7	1.1
2005	31.7	3.8	4 years	6.7	0.6
2006	30.6	4.1	5 years	3.4	0.2
2007	30.3	4.0	6 years	13.2	0.3
			7 years	11.0	0.7
				(100.0)	(100.0)

a) Source: Authors' own calculations based on HILDA waves 2001-07. Population-weighted results. Households with reference persons who are full-time students are excluded.

b) The reference person remained in this type of household for all seven years.

Women are more at risk than men (see Tables 4.5 to 4.7). For females of working age, differences are driven by a disproportionate share of female-headed lone parent households compared to male-headed lone parent households. Tables 4.5 to 4.7 confirm that joblessness decreased for both genders and across all age groups in the years 2001-2007. In all age groups, females are more likely to live in jobless households, which can be explained by the fact that the majority of lone parent households are single-mother households.

Women are also more likely to be in a jobless household for more out of the seven years than men. Women are more likely than men to be observed at any rate of joblessness persistence from 1 year to 7 years. This is independent of whether they are working age or not (Table 4.6) and even of whether they are prime working age or not (Table 4.7).

**Table 4.5: Individuals in Jobless Households 2001-07<sup>a</sup>**

	<b>Cross-sectional</b>				<b>Longitudinal</b>		
	All %	Male %	Female %		All %	Male %	Female %
2001	22.2	20.3	24.1	Never	65.8	68.7	63.1
2002	22.3	20.8	23.8	1 year	6.2	6.1	6.3
2003	21.8	19.9	23.7	2 years	3.1	2.9	3.3
2004	21.8	19.8	23.7	3 years	2.7	2.7	2.7
2005	21.2	18.8	23.4	4 years	2.2	2.1	2.2
2006	20.5	18.6	22.3	5 years	1.8	1.8	1.9
2007	20.1	18.0	22.2	6 years	3.6	3.4	3.8
				7 years	14.6	12.4	16.7
					(100.0)	(100.0)	(100.0)

a) Source: Authors' own calculations based on HILDA waves 2001-07. Population-weighted results.

**Table 4.6: All Working-Age Individuals (15-64) in Jobless Households 2001-07<sup>a</sup>**

	Cross-sectional				Longitudinal		
	All %	Male %	Female %		All %	Male %	Female %
2001	12.9	11.2	14.6	Never	78.9	81.4	76.4
2002	13.2	11.6	14.7	1 year	6.4	5.9	7.0
2003	12.2	10.5	13.9	2 years	3.0	2.7	3.4
2004	12.2	10.3	14.0	3 years	2.5	2.4	2.6
2005	11.5	9.7	13.4	4 years	1.8	1.6	2.0
2006	10.9	9.5	12.4	5 years	1.2	1.1	1.3
2007	10.5	8.5	12.4	6 years	2.5	2.0	2.9
				7 years	3.7	3.0	4.4
					(100.0)	(100.0)	(100.0)

a) Source: Authors' own calculations based on HILDA waves 2001-07. Population-weighted results.

**Table 4.7: Prime Working-Age Individuals (25-54) in Jobless Households 2001-07<sup>a</sup>**

	Cross-sectional				Longitudinal		
	All %	Male %	Female %		All %	Male %	Female %
2001	9.7	8.7	10.7	Never	83.7	86.3	81.2
2002	9.4	8.1	10.7	1 year	5.5	5.0	6.1
2003	8.6	7.1	10.1	2 years	2.3	1.8	2.9
2004	8.4	6.7	9.9	3 years	2.0	1.6	2.4
2005	8.0	6.3	9.6	4 years	1.1	1.0	1.2
2006	7.9	6.3	9.5	5 years	1.1	1.0	1.1
2007	7.4	5.3	9.4	6 years	1.9	1.5	2.3
				7 years	2.3	1.7	2.8
					(100.0)	(100.0)	(100.0)

a) Source: Authors' own calculations based on HILDA waves 2001-07. Population-weighted results.

There is a higher percentage of joblessness in households with a female reference person than in households with a male reference person (see Table 4.8). Again, this is mainly due to the high rate of joblessness among single-mother households. The drop in joblessness for prime-age households (see Table 4.9) compared with all working-age households (Table 4.8) is occurring mostly for households with a male household head. The change in joblessness rates for prime-age female head households is relatively small.

Selecting lone person households only of prime working age in Table 4.10, the difference between men and women decreases, although women are still more likely to be jobless at any point in time (except in 2001) and experience more persistence in joblessness. However, lone men households are much more likely than other households with a male reference person to be jobless. Unlike the time pattern of household joblessness for all other groups, joblessness does not appear to steadily decrease over time for lone women households of prime working age.

**Table 4.8: All Working-age Households (ref. person 15-64) 2001-07<sup>a</sup>**

	Cross-sectional in %				Longitudinal in %		
	All	Male ref. person	Female ref. person		All	Male ref. person	Female ref. person
2001	15.0	10.6	35.3	Never	77.1	82.5	52.3
2002	15.1	10.6	34.8	1 year	6.8	5.9	10.4
2003	14.5	10.2	33.5	2 years	3.2	2.4	7.1
2004	14.3	9.7	33.5	3 years	2.7	2.1	5.7
2005	13.6	9.4	31.3	4 years	2.0	1.6	3.8
2006	12.9	9.0	29.4	5 years	1.4	1.0	3.5
2007	12.3	8.7	27.7	6 years	2.9	1.7	8.5
				7 years	3.9	2.8	8.6
					(100.0)	(100.0)	(100.0)

a) Source: Authors' own calculations based on HILDA waves 2001-07. Population-weighted results. Households with reference persons who are full-time students are excluded.

**Table 4.9: All Prime Age Households (ref. person 25-54) 2001-07<sup>a</sup>**

	Cross-sectional in %				Longitudinal in %		
	All	Male ref. person	Female ref. person		All	Male ref. person	Female ref. person
2001	12.1	7.4	34.0	Never	80.8	87.0	52.1
2002	12.0	6.8	34.0	1 year	6.2	5.3	10.3
2003	11.1	6.2	32.3	2 years	3.0	1.9	7.9
2004	10.7	5.5	32.2	3 years	2.6	1.6	6.7
2005	10.1	5.4	30.0	4 years	1.5	1.1	3.3
2006	9.8	5.5	29.2	5 years	1.3	0.7	3.7
2007	9.4	5.3	27.7	6 years	2.3	0.9	8.5
				7 years	2.5	1.4	7.5
					(100.0)	(100.0)	(100.0)

a) Source: Authors' own calculations based on HILDA waves 2001-07. Population-weighted results. Households with reference persons who are full-time students are excluded.

**Table 4.10: Lone Person Households, Prime Working-Age (ref. person 25-54) 2001-07<sup>a</sup>**

	Cross-sectional in %				Longitudinal in %		
	All	Male ref. person	Female ref. person		All	Male ref. person	Female ref. person
2001	20.8	21.6	19.3	Never	73.7	74.9	71.6
2002	19.6	18.6	21.4	1 year	8.4	7.6	9.8
2003	15.8	14.5	18.1	2 years	3.1	3.5	2.5
2004	14.9	14.2	16.4	3 years	3.4	3.5	3.3
2005	15.5	13.8	18.9	4 years	1.3	1.8	0.3
2006	12.3	11.1	14.7	5 years	2.2	2.1	2.3
2007	12.1	8.6	19.6	6 years	3.2	2.7	4.0
				7 years	4.7	3.8	6.3
					(100.0)	(100.0)	(100.0)

a) Source: Authors' own calculations based on HILDA waves 2001-07. Population-weighted results. Households with reference persons who are full-time students are excluded.

Table 4.11 presents the proportion of joblessness amongst households with a disabled reference person. Both households with male and female reference persons are much more likely to be jobless than any of the groups presented in the previous tables. Similar to the results in previous tables, women within this group are much more affected by joblessness than men.

**Table 4.11: Households with a Disabled Reference Person, Prime Working-Age (ref. person 25-54) 2001-07<sup>a</sup>**

	Cross-sectional in %				Longitudinal in %		
	All	Male ref. person	Female ref. person		All	Male ref. person	Female ref. person
2001	30.1	24.7	50.0	Never	60.8	68.5	34.9
2002	32.1	26.3	49.8	1 year	7.5	6.5	10.7
2003	25.5	20.1	43.2	2 years	4.9	3.9	8.1
2004	23.7	19.2	41.9	3 years	5.3	4.9	6.4
2005	25.3	20.7	38.7	4 years	4.1	3.9	5.0
2006	25.6	20.0	40.9	5 years	4.9	3.6	9.3
2007	25.0	19.5	41.9	6 years	5.4	3.2	12.6
				7 years	7.2	5.4	13.0
					(100.0)	(100.0)	(100.0)

a) Source: Authors' own calculations based on HILDA waves 2001-07. Population-weighted results. Households with reference persons who are full-time students are excluded.

Another group which is often considered relatively disadvantaged are migrants from a NESB background. However, comparing Table 4.12 with Table 4.9, households with a NESB reference person do not appear to be very different from others, especially considering persistence as defined in these tabulations. Men from a NESB background are relatively more affected than women when comparing joblessness between those with and without a NESB background on a cross-sectional year-to-year basis.

**Table 4.12: Households with NESB Reference Person, Prime Working Age (ref. person 25-54) 2001-07<sup>a</sup>**

	Cross-sectional in %				Longitudinal in %		
	All	Male ref. person	Female ref. person		All	Male ref. person	Female ref. person
2001	15.9	11.7	32.4	Never	79.7	87.0	45.0
2002	14.5	8.6	39.0	1 year	8.2	6.8	15.0
2003	18.6	11.4	43.1	2 years	3.4	2.2	9.3
2004	13.2	7.4	34.8	3 years	1.8	0.3	8.8
2005	11.3	6.3	35.8	4 years	1.9	0.7	7.7
2006	15.0	12.4	28.0	5 years	1.0	0.9	1.5
2007	14.9	11.5	28.7	6 years	0.8	0.2	3.7
				7 years	3.2	2.0	9.1
					(100.0)	(100.0)	(100.0)

a) Source: Authors' own calculations based on HILDA waves 2001-07. Population-weighted results. Households with reference persons who are full-time students are excluded.

## **4.2 Prevalence and Persistence of Jobless Households**

### **4.2.1 The prevalence**

Table 4.13 presents the proportions of individuals of any age living in a jobless household year by year between 2001 and 2007 by a number of individual and household characteristics.<sup>13</sup> About 24 per cent of individuals lived in a jobless household in 2001 and 2002 but this proportion decreased steadily since then to reach 21.4 per cent by 2007.

Similar to the result in Section 4.1, individuals in couple households show the lowest incidence of household joblessness on average (16.3 per cent) while the highest proportion (46.9 per cent) is found for lone person households. For all household types, except for group households, the incidence of household joblessness decreased between 2001 and 2007.

As expected, the incidence of household joblessness is negatively correlated with the number of working-age members in the household. The proportion of individuals living in jobless households shows a decreasing trend over time for all age groups. The highest proportions are found for the older age groups and to some extent also for the younger age groups (indicating the proportion of children living in jobless households). Table 4.13 shows a very large increase in the proportion of those in jobless households once the Age Pension age (65 years for men and 62 or 63 years for women, depending on the year of observation) is passed. However, similar to the results for all subgroups, the incidence of household joblessness for older individuals decreases over time.

Table 4.13 also shows that individuals without children have higher probabilities of household joblessness. This is mainly because most older adults who are more likely to be retired do not live with children.

Table 4.14 again reports the incidence of household joblessness by a range of household characteristics but now for a smaller sample than in Table 4.13. In Table 4.14, individuals over the official Age Pension age as well as those who retired early are excluded.<sup>14</sup> As a result, the incidence of household joblessness drops considerably. In 2001, 11.7 per cent of non-retired individuals lived in a jobless household and this proportion was reduced to 8.2 per cent by 2007.

Observing the highest proportion of household joblessness for lone persons in Table 4.13 was due to the influence of retirees. Once the latter group is excluded, Table 4.14 shows that lone

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<sup>13</sup> Note that Tables 4.13, 4.14 and 4.15 examining the incidence of household joblessness are weighted using the population weights provided in the HILDA data. Tables 4.16, 4.17 and 4.18 looking at the persistence of household joblessness are weighted using the longitudinal weights provided in the HILDA data.

<sup>14</sup> In addition, households where the household head is retired or where all members are students are also excluded.

parents have the highest incidence of household joblessness. However, couples remain the group with the lowest incidence of household joblessness.

**Table 4.13 Proportion of individuals in jobless households by year (all ages, in per cent)**

	2001	2002	2003	2004	2005	2006	2007	Total	No of obs.
All	23.8	24.3	23.7	23.6	22.7	21.5	21.4	23.0	111,585
By household type:									
Couple	16.4	17.0	16.8	16.4	16.3	15.6	15.6	16.3	79,931
Lone parent	38.0	37.9	38.1	38.3	33.5	30.3	30.3	35.1	12,781
Other related family	26.0	21.1	22.2	28.0	22.5	35.5	16.9	24.5	936
Lone person	52.0	49.9	47.6	46.1	46.2	43.9	43.6	46.9	14,302
Group	25.6	25.5	30.7	31.1	28.0	28.3	39.5	29.1	1,729
Multi-family	41.3	49.8	39.3	46.7	42.2	35.2	32.7	40.9	1,906
Number of working-age persons in household (15 - up to Age Pension age)									
0	89.6	88.7	88.9	89.4	88.9	87.9	88.0	88.8	12,756
1	38.6	40.3	37.1	37.2	36.9	32.6	32.5	36.4	20,850
2	9.5	9.7	9.6	9.7	8.8	9.3	8.7	9.3	54,059
3	7.8	9.5	7.6	7.5	5.9	5.3	4.6	6.9	14,792
more	4.3	2.3	4.5	4.1	4.5	2.8	4.0	3.8	9,128
Age									
Less than 5	17.6	19.6	18.3	16.8	16.2	13.3	13.6	16.4	8,286
5-14	15.9	15.7	15.4	16.3	15.2	14.1	13.9	15.2	17,500
15-24	13.4	13.2	12.5	11.2	10.8	9.5	9.8	11.4	14,697
25-44	10.0	10.3	9.1	9.0	8.4	7.8	7.6	8.9	31,689
45-54	12.3	11.9	12.5	11.3	10.3	9.9	9.2	11.0	14,541
55-64	34.7	36.8	33.8	34.0	32.5	29.9	29.0	32.8	10,851
65 and older	81.5	80.8	81.6	81.4	80.5	79.6	78.1	80.4	14,021
Individuals around Age Pension age									
Men 55-64	28.9	31.5	29.5	30.0	29.0	27.4	25.4	28.8	5,307
Men over 65	80.9	80.4	80.2	80.1	78.4	77.2	76.1	79.0	6,288
Women 55- Age Pension age	32.4	35.2	30.7	32.7	30.2	27.8	28.0	30.8	4,403
Women over Age Pension age	80.9	80.4	80.2	80.1	78.4	77.2	76.1	79.0	6,288
Individuals, retiring during 2001-2007									
Men	52.8	54.4	54.7	54.4	54.7	55.7	57.1	54.7	13,653
Women	55.0	57.9	58.9	58.6	59.2	59.2	60.6	58.3	6,211
Women	51.0	51.4	51.2	50.9	50.9	52.7	54.1	51.7	7,442
Not retired	27.4	20.9	17.4	44.6	23.4	21.9	28.3	29.3	4,584
Reference person is:									
Retired	89.5	89.5	89.0	89.4	89.1	88.7	88.5	89.1	15,475
Not retired	13.2	12.8	11.9	14.7	11.1	9.9	9.6	11.9	96,110
Number of children									
no children	36.0	36.9	36.2	36.3	34.6	33.7	33.7	35.3	48,762
1	15.2	13.1	12.9	12.9	13.4	10.9	9.9	12.5	17,558
2	10.4	11.6	11.4	9.9	10.9	9.2	9.6	10.4	25,683
3	12.1	14.7	14.2	12.9	10.1	11.1	10.6	12.2	12,871
more than 3	25.5	22.3	21.0	23.8	19.0	18.0	19.9	21.3	6,711

**Table 4.14 Proportion of individuals under Age Pension age in jobless households by household characteristics and year (in per cent)**

	2001	2002	2003	2004	2005	2006	2007	Total	No of obs.
All	11.7	10.7	9.9	13.0	9.3	8.5	8.2	10.2	88,249
By household type:									
Couple	5.8	4.8	4.2	7.3	4.4	4.0	3.9	4.9	66,810
Lone parent	37.1	37.0	36.9	36.4	31.8	29.7	29.0	33.9	11,625
Other related family	14.1	11.5	11.5	31.7	15.2	29.0	6.5	16.6	655
Lone person	21.9	16.7	13.2	22.1	13.6	10.2	10.7	15.5	7,916
Group	15.9	11.2	16.3	15.3	11.5	11.3	16.1	14.1	1,243
Size of the household:									
1 person	20.5	15.8	13.6	21.4	13.4	10.4	11.2	15.3	9,159
2 persons	12.9	10.9	10.0	18.7	10.0	8.8	8.2	11.5	17,844
3 persons	13.1	13.7	13.2	13.5	12.5	11.8	9.8	12.5	16,079
4 persons	7.5	7.5	7.0	5.8	4.9	5.6	6.7	6.4	24,737
5 persons	7.6	6.9	5.4	7.5	7.4	5.8	4.1	6.4	13,154
more	15.7	14.3	15.1	18.2	12.7	11.3	13.4	14.3	7,276
Number of working-age members in household (15 - up to Age Pension age)									
1	32.9	31.3	29.1	34.1	27.8	24.2	23.2	28.9	17,057
2	7.0	5.9	6.0	9.0	5.6	5.5	5.6	6.4	49,490
3	6.3	4.8	3.4	7.5	2.3	4.0	2.2	4.4	13,372
4 or more	2.6	0.8	0.7	4.3	2.9	0.3	1.1	1.9	8,196
Number of resident children									
0	11.4	9.0	7.6	15.9	7.2	6.6	6.4	9.2	29,023
1	12.4	10.1	9.9	10.8	10.3	8.6	7.2	9.9	15,636
2	9.1	9.7	9.2	8.8	8.9	8.3	8.5	8.9	24,677
3	11.3	13.5	13.2	11.0	9.6	10.1	9.3	11.1	12,409
4 or more	23.9	20.1	19.3	23.5	18.3	16.2	19.6	20.1	6,504
With preschoolers	14.6	14.8	14.1	14.0	13.6	11.1	12.0	13.4	26,778
With child(ren) but no preschoolers	9.5	8.9	8.4	8.8	7.7	8.2	6.8	8.3	32,448
Remoteness									
Major City	10.4	9.8	9.5	11.1	7.8	7.2	6.7	8.9	53,606
Inner Regional	13.8	11.8	9.5	15.5	12.0	11.0	10.5	12.0	22,220
Outer Regional	15.4	13.6	12.5	18.0	12.2	10.7	12.8	13.6	10,456
Remote	13.2	9.4	13.3	19.5	12.8	9.1	6.1	12.1	1,517
SEIFA deciles									
1	27.7	26.0	24.9	31.9	25.3	23.4	26.5	26.6	7,718
2	19.6	16.6	13.7	19.0	17.5	17.8	17.8	17.5	9,286
3	17.2	13.9	13.1	16.2	11.8	13.4	11.4	13.9	10,046
4	14.7	12.8	11.9	14.7	13.7	10.6	10.0	12.6	8,958
5	10.8	9.6	8.3	10.6	6.8	5.2	6.0	8.1	9,117
6	9.9	10.7	4.8	9.5	6.7	4.7	4.8	7.2	7,747
7	7.7	6.1	10.1	9.4	4.2	4.3	3.7	6.5	8,664
8	5.3	6.9	6.7	9.9	4.5	5.4	2.5	5.9	8,369
9	4.7	4.9	5.1	6.2	3.4	1.6	2.1	3.9	9,248
10	3.4	4.1	3.5	5.3	3.4	2.6	3.0	3.6	9,087
Reference person characteristics									
Male	7.8	6.5	5.7	8.8	5.4	5.0	4.8	6.3	74,242
Female	32.9	31.6	31.8	34.4	29.1	26.9	25.8	30.3	14,007

**Table 4.14 Continued**

	2001	2002	2003	2004	2005	2006	2007	Total	No of obs.
Education (reference person)									
Below year 10	29.1	27.2	24.0	35.4	30.3	27.9	27.4	29.0	6,501
Year 10-11 or certificate									
I-II	18.7	17.1	16.6	19.5	14.9	14.3	13.3	16.4	17,367
Secondary school	11.7	9.0	10.8	13.6	9.2	10.8	8.6	10.5	9,575
Certificate III/IV	7.2	7.5	6.5	9.0	7.4	4.8	5.1	6.8	25,575
Diploma	8.9	8.3	8.4	10.0	5.4	6.5	6.0	7.6	8,278
Degree and above	4.1	4.1	3.8	4.4	2.9	3.0	3.7	3.7	20,908

The incidence of household joblessness tends to decrease with household size when the latter is between one and five members, but it then increases for households with more than five members. However, it appears to be the composition of the household rather than the size that matters. The proportion of individuals in jobless households steeply decreases with the number of working-age members, whereas it tends to increase with the presence of preschool children or with an increase in the number of children above three.

The proportion of individuals in jobless households is smaller in major cities than in other areas. In addition, Table 4.14 shows a strong correlation between the regional measure of disadvantage, the SEIFA index, (where a higher decile represents a neighbourhood that is more advantaged than a neighbourhood with a lower decile score) and the incidence of household joblessness. The latter sharply decreases with the SEIFA deciles. This effect is particularly strong in the bottom deciles.

Based on the same sample as Table 4.14, Table 4.15 presents the incidence of household joblessness by a range of individual characteristics. The table shows that household joblessness is more prevalent amongst children under 15 and adults aged between 55 and 64 than amongst adults of prime working age (15-54).

As shown already in Section 4.1 (see Tables 4.5 to 4.7), Table 4.15 shows that women are slightly more at risk than men. However, the difference in risk between men and women in general is not as pronounced as for mature age women (see Table 4.13).

The incidence of household joblessness is particularly high for those with an education level below Year 10 (24 per cent on average). However, the incidence continuously declines with education level and is at its minimum for degree holders (3.2 per cent). Note that the incidence of household joblessness is twice smaller for individuals who have completed Year 10 or 11 or have a Certificate I/II than for those with an education level below Year 10.

Table 4.15 also shows a correlation between mental and physical health, and household joblessness. A low value on the mental health index as well as long-term or work-limiting

health conditions are associated with higher proportions of household joblessness. Household joblessness is also more prevalent amongst individuals from an indigenous background than amongst others in the Australian population. However, it should be noted that there are only few observations in this group.

**Table 4.15 Proportion of individuals under Age Pension age in jobless households by individual characteristics and year (in per cent)**

	2001	2002	2003	2004	2005	2006	2007	Total No of obs.	
All	11.7	10.7	9.9	13.0	9.3	8.5	8.2	10.2	88,249
Male	11.5	10.3	9.0	12.1	7.9	7.8	7.2	9.4	44,241
Female	11.9	11.0	10.9	13.8	10.7	9.1	9.2	10.9	44,008
Age									
Less than 5	15.9	17.0	16.7	15.0	14.2	11.5	12.1	14.6	7,864
5-14	15.0	14.6	14.3	14.8	14.1	13.7	13.2	14.2	17,011
15-24	9.9	9.9	9.4	9.4	8.6	7.4	8.3	9.0	13,147
25-44	9.4	9.4	8.3	8.2	7.9	7.4	7.1	8.2	30,563
45-54	9.5	6.4	6.4	10.6	5.7	5.4	3.9	6.8	13,025
55-64	17.7	9.2	6.4	31.0	7.5	5.7	5.9	13.3	6,639
Education level									
Below Year 10	26.2	22.1	20.0	33.9	21.5	19.1	19.8	24.0	4,316
Year 10-11 or certificate I/II	13.2	12.5	11.1	15.1	10.8	9.7	9.6	11.8	16,942
Year 12	8.7	7.3	7.5	10.4	7.1	8.4	7.9	8.2	10,177
Certificate III/IV	8.6	7.3	6.1	10.7	7.1	4.8	4.7	7.0	12,462
Diploma	6.8	5.0	5.7	9.4	4.1	5.0	3.6	5.6	5,382
Degree and above	4.0	3.8	3.2	4.5	2.4	2.2	2.5	3.2	14,026
Mental health index									
80-100	6.0	5.3	4.8	8.0	3.7	3.7	3.7	5.0	28,936
60-79.9	9.6	8.0	7.3	11.7	7.3	6.5	5.4	8.0	19,107
<60	21.0	18.2	16.8	22.5	15.8	15.0	14.4	17.8	9,772
Long-term health condition	27.1	24.3	19.6	28.6	19.0	19.1	17.9	22.5	12,559
Work limiting health condition	34.4	29.6	25.0	37.3	24.1	22.2	21.7	28.2	7,592
Non-English background	15.4	11.6	11.4	17.6	8.6	10.3	8.6	12.0	5,820
Indigenous	32.0	31.2	22.0	32.2	29.9	25.4	26.8	28.4	1,326
No children	11.4	9.3	8.0	15.2	7.7	6.9	6.8	9.4	35,128
Has children	9.0	8.3	7.8	8.5	7.2	6.8	6.2	7.7	28,177
Work experience									
less than 1 year	31.4	24.9	29.3	29.8	27.0	26.7	28.2	28.1	2,464
1-5 years	13.8	14.5	10.8	13.6	10.3	9.4	9.3	11.6	6,698
5-10 years	12.1	9.4	9.4	9.5	8.7	6.8	7.3	9.0	7,629
10-30 years	7.9	7.0	5.8	8.9	4.7	4.0	3.3	6.0	29,754
more than 30 years	9.7	4.9	3.5	16.4	4.3	3.2	2.9	6.7	10,719
Unemployment history									
Never unemployed	7.7	4.7	3.9	9.9	3.0	2.6	2.7	5.1	36,006
Less than 1 year	6.0	11.2	9.0	10.2	7.0	5.5	4.7	7.4	9,732
1-2 years	15.4	12.7	10.7	11.6	10.0	9.6	7.4	11.0	6,596
more than 2 years	35.6	30.3	27.7	30.8	28.3	25.4	24.0	28.7	4,650
Participation in labour force since full-time education									
Always participated	2.4	2.4	2.8	4.8	4.1	3.9	4.1	3.5	22,325
More than half time	10.9	8.4	6.7	11.4	5.3	4.4	3.9	7.2	33,250
Half time and less	29.5	28.1	27.8	34.6	29.4	27.5	28.0	29.4	7,357

Work experience is negatively correlated with household joblessness, whereas the correlation is positive for unemployment spells and the proportion of time spent out of the labour force since completing full-time education.

#### **4.2.2 The persistence**

Table 4.16 reports the persistence of household joblessness by a range of individual and household characteristics. Individuals of any age for whom household joblessness can be determined across each of the seven waves of HILDA are included. Individual and household characteristics are as reported in 2001 (i.e. in wave one).

Table 4.16 shows that about 15 per cent of individuals spent all seven years covered by the HILDA survey in a jobless household, whereas 62.6 per cent never experienced household joblessness during this period. This means that about 20 per cent of individuals were in a jobless household for periods of time between one and six years.

Consistent with the results in Table 4.13, Table 4.16 shows that the highest level of persistence in household joblessness is found for lone persons. Lone parents are not as likely as other groups to be jobless for the full period of seven years, but they are more likely than other groups to experience household joblessness for a total of two to six years out of the total period of seven year. This indicates that this group is more likely to move in and out of joblessness whereas for the lone person households it appears to be more likely to be a “permanent” state (which is most likely due to the age distribution of these groups).

Another result in line with Table 4.13 is that the persistence of household joblessness is highly negatively correlated with the number of working-age members in the household. The persistence of household joblessness is also much higher for older age groups, especially for those over the Age Pension age, than for the younger groups in the population. A similar result is evident for those individuals in the sample who reach Age Pension age during the first seven waves (see Appendix Table A1). Just under 60 per cent were retired for at least some of the time before reaching the official Age Pension age. Between 55 and 58 per cent of men and between 42 and 45 per cent of women who reached Age Pension age in the first seven years of the HILDA lived for at least a proportion of time in a jobless household.

Table 4.17 reports the persistence of household joblessness by a range of household characteristics for a limited sample. Compared to the sample used in Table 4.16, all those who reached Age Pension age during the first seven waves of HILDA are excluded. In addition, those who lived in a multi-family household in the first wave, those who were full-time student in the first wave, as well as those who lived in a household in which all adult members were retired in the first wave are excluded. In this restricted sample, less than one fifth of all individuals experienced household joblessness over the 7-year period covered by the HILDA and only about two per cent spent all seven years in a jobless household. Lone

parents now show the highest levels of persistence in household joblessness whereas the lowest levels are for couple households.

The persistence of household joblessness is more correlated with the number of working-age adults in the household than with the total size of the household. In addition, individuals in households with four or more children or in households with preschool-aged children exhibit higher levels of persistence.

**Table 4.16 Persistence of household joblessness by individual and household characteristics in wave 1 (all ages, in per cent)**

	Never	1 year	2-3 years	4-6 years	7 years	No of obs.
All	62.6	6.6	5.9	7.7	14.9	9,954
By household type:						
Couple	70.9	6.1	5.1	6.3	11.7	7,481
Lone parent	48.4	9.6	13.7	18.0	10.2	924
Other related family	56.4	13.6	7.2	15.1	7.8	62
Lone person	38.4	5.4	5.5	8.1	42.6	1,206
Group	61.2	14.7	7.6	3.8	12.8	150
Multi-family	53.2	11.3	3.1	15.1	17.3	131
Number of working-age members in household (15 - up to Age Pension age)						
0	4.0	1.7	3.5	12.2	78.5	1,389
1	47.9	10.5	10.8	17.0	13.8	1,811
2	81.3	6.5	5.5	4.4	2.3	5,281
3	82.6	7.8	4.4	4.8	0.5	963
4 or more	86.8	6.1	4.3	2.3	0.5	510
Number of children in the household						
no children	48.5	6.3	5.6	10.3	29.2	4,328
1	74.0	9.4	6.9	6.6	3.1	1,413
2	81.6	5.7	5.1	5.6	2.0	2,376
3	80.1	7.4	6.1	4.4	2.0	1,171
more than 3	68.5	5.9	12.4	7.0	6.2	666
Age						
Less than 5	73.2	7.9	6.6	7.7	4.5	865
5-14	76.1	7.0	7.9	6.4	2.7	1,624
15-24	74.6	11.4	7.6	5.0	1.4	854
25-44	82.2	6.4	4.5	4.4	2.5	3,075
45-54	72.8	5.4	6.8	6.8	8.2	1,318
55-64	33.6	8.5	7.9	19.2	30.7	1,047
65 and older	8.3	2.4	4.0	12.7	72.5	1,171
Individuals around Age Pension age						
Men 51-57 in 2001	63.4	7.7	6.9	10.9	11.0	418
Men 58-64 in 2001	30.1	9.4	9.0	18.9	32.5	342
Men 65-71 in 2001	11.4	4.9	6.9	15.5	61.2	277
Women 49-55 in 2001	61.0	8.2	9.2	10.5	11.1	452
Women 56-61 in 2001	28.7	9.6	9.3	21.2	31.3	341
Women 62-67 in 2001	14.1	4.9	6.2	19.5	55.3	297
Reference person is						
Not retired	72.3	7.4	6.3	7.1	4.5	8,575
Retired	4.0	1.8	3.6	11.7	78.9	1,379

**Table 4.17 Persistence of household joblessness by household characteristics in wave 1, restricted sample (in per cent)**

	Never	1 year	2-3 years	4-6 years	7 years	No of obs.
All	81.2	6.8	5.5	4.4	2.1	7,257
By household type						
Couple	87.3	5.7	3.8	2.2	1.0	5,731
Lone parent	49.9	10.4	14.6	17.2	7.9	825
Other related family	64.3	14.7	4.9	16.0	0.0	46
Lone person	78.2	7.8	7.2	4.1	2.7	541
Group	71.6	14.5	6.9	3.0	4.1	114
Size of the household						
1 person	76.4	9.5	7.1	3.8	3.1	655
2 persons	82.5	5.6	4.9	5.2	1.7	1,272
3 persons	74.8	8.7	5.9	7.9	2.8	1,239
4 persons	85.9	5.7	3.8	3.1	1.5	2,252
5 persons or more	81.3	6.2	7.6	2.8	2.2	1,839
Number of working-age members in household (15 - up to Age Pension age)						
1	59.3	10.7	10.5	12.5	6.9	1,210
2	85.8	5.9	4.7	2.4	1.3	4,741
3	86.5	6.4	3.3	3.6	0.2	849
4 or more	89.5	4.7	4.3	1.3	0.3	453
Number of resident children						
0	83.9	6.8	4.0	3.5	1.9	1,956
1	78.1	8.4	6.1	4.9	2.4	1,237
2	82.8	5.4	5.0	5.0	1.7	2,279
3	80.7	7.5	6.0	3.8	2.0	1,143
4 or more	70.7	6.1	12.9	5.9	4.4	642
With preschoolers	77.8	7.2	6.0	5.7	3.3	2,760
With child(ren) but no preschoolers	82.2	6.3	6.5	4.0	1.1	2,541
Remoteness						
Major City	83.7	6.1	4.5	3.9	1.7	4,433
Inner Regional	77.2	6.4	8.2	5.8	2.3	1,897
Outer Regional	74.1	12.0	6.4	3.9	3.6	829
Remote	78.5	3.9	4.9	7.0	5.7	98
SEIFA deciles						
1	63.8	8.7	10.5	9.2	7.8	521
2	75.8	8.0	5.7	7.3	3.2	810
3	73.3	7.9	9.6	6.2	2.9	866
4	73.4	6.3	10.2	8.3	1.7	791
5	83.7	8.9	3.4	1.4	2.7	743
6	82.6	7.0	5.5	2.4	2.5	600
7	86.9	5.6	2.0	3.4	2.1	731
8	86.0	7.5	3.2	3.4	0.0	667
9	88.3	4.5	3.9	2.8	0.4	807
10	91.0	4.2	3.4	1.5	0.0	721
Reference person characteristics						
Male	85.4	6.2	4.2	2.7	1.4	12
Female	56.6	10.0	13.2	14.1	6.1	6

**Table 4.17 Continued**

	Never	1 year	2-3 years	4-6 years	7 years	No of obs.
Education (reference person)						
Below year 10	61.3	8.0	5.6	13.8	11.3	473
Year 10-11 or certificate I-II	72.0	8.7	8.9	6.7	3.7	1,423
Secondary school	82.0	8.5	4.8	3.4	1.3	734
Certificate III/IV	85.5	6.3	4.8	2.6	0.8	2,112
Diploma	82.6	5.1	6.6	5.2	0.6	694
Degree and above	88.8	5.2	3.4	2.0	0.5	1,821

The persistence of household joblessness is negatively correlated with the SEIFA index and it is lower in major cities than in other areas. The sample size for remote Australia is probably too small for the results to be significant, but it is clear that individuals living in regional and more remote areas are more likely to experience household joblessness.

The persistence of household joblessness is also negatively correlated with the education level of the reference person in the household. In addition, the persistence is much lower if the reference person is a male rather than a female.

Based on the same sample as Table 4.17, Table 4.18 reports the persistence of household joblessness by a range of individual characteristics. The persistence is lower for males than for females. It is also lower for those aged between 25 and 64 than for those under 25. Individual education levels are negatively correlated with the persistence of household joblessness.

As was the case with the incidence of household joblessness (see Table 4.15), those with a low value on the mental health index or with long-term or work-limiting health conditions exhibit higher levels of persistence. The correlation with higher persistence levels is also particularly strong for people from an indigenous background. However, as noted before, this is only a small group in the HILDA sample.

The differences in persistence between those who have child(ren) and those who do not are fairly small, where those with children appear to experience slightly less persistent household joblessness.

As expected, and in line with the incidence table (Table 4.15), the persistence is higher for those who have experienced unemployment spells in the past and for those who have spent a large proportion of their time (since completing full-time education) out of the labour force. By contrast, the persistence in household joblessness is negatively correlated with work experience.

**Table 4.18 Persistence of household joblessness by individual characteristics in wave 1, restricted sample (in per cent)**

	Never	1 year	2-3 years	4-6 years	7 years	No of obs.
All	81.2	6.8	5.5	4.4	2.1	7,257
Male	82.7	6.2	5.3	4.0	1.8	3,617
Female	79.6	7.3	5.8	4.8	2.4	3,640
Age						
Less than 5	73.6	7.9	6.7	7.5	4.2	848
5-14	76.7	6.7	7.9	6.0	2.7	1,605
15-24	76.2	10.8	7.6	4.4	1.0	794
25-44	83.9	6.3	4.3	3.6	1.9	2,928
45-54	90.2	3.0	3.3	2.2	1.4	934
55-64	89.4	4.4	1.9	3.4	1.0	148
Education level						
Below Year 10	67.1	7.5	7.8	10.2	7.5	266
Year 10-11 or certificate I/II	76.3	8.3	7.1	5.7	2.7	1,254
Year 12	84.0	7.7	4.9	2.1	1.3	739
Certificate III/IV	87.9	4.5	4.3	2.3	1.0	920
Diploma	86.3	5.4	4.2	4.0	0.1	441
Degree and above	91.2	5.7	1.7	1.1	0.3	1,182
Mental health index						
80-100	88.5	5.6	3.2	1.7	1.1	2,276
60-79.9	84.0	6.5	4.9	3.4	1.2	1,595
<60	70.4	8.8	9.0	7.5	4.1	744
Long-term health condition	68.4	8.5	9.4	9.3	4.5	812
Work limiting health condition	60.5	10.0	9.4	12.1	8.0	429
Non-English background	80.8	8.2	5.0	4.4	1.6	388
Indigenous	54.5	9.1	14.9	11.5	10.0	67
No children	82.0	7.8	5.1	3.5	1.6	2,368
Has children	85.5	5.1	4.2	3.4	1.7	2,434
Work experience						
less than 1 year	53.4	13.1	13.7	7.4	12.4	130
1-5 years	74.2	10.6	6.6	5.5	3.1	415
5-10 years	80.1	8.1	4.7	4.8	2.2	636
10-30 years	88.2	5.0	3.4	2.6	0.8	2,733
more than 30 years	90.6	3.1	3.0	2.0	1.2	587
Unemployment history						
Never unemployed	88.7	5.2	2.9	2.1	1.1	3,196
Less than 1 year	86.0	6.8	4.3	2.1	0.7	464
1-2 years	77.5	9.7	6.2	5.0	1.6	546
more than 2 years	50.1	9.1	15.0	15.5	10.4	295
Participation in labour force since full-time education						
Always participated	90.2	5.1	3.2	1.5	0.1	1,805
More than half time	85.0	6.4	4.3	3.2	1.1	2,429
Half time and less	71.6	8.2	8.3	7.5	4.3	3,023

### 4.3 Prevalence and Persistence of Children in Jobless Households

Given the general concern with children growing up in jobless households related to potential intergenerational correlation of for example labour market outcomes or poverty, we briefly discuss children separately. Tables 4.13, 4.15, 4.16 and 4.18 in Section 4.2 reported the proportion of children living in jobless households. This showed that children under 15 years of age are more likely to be a member of a jobless household than older individuals under 55 years of age. When excluding those who are retired, children under 15 years of age are also more likely to live in jobless households than individuals between 55 and 64 years of age. However, similar to the time patterns for other individuals, Table 4.19 shows that the proportion of children in jobless households declined over the years 2001 to 2007.

**Table 4.19: Children under 15 in jobless households - total population and single parent households: cross-sectional and longitudinal results<sup>a</sup>**

Cross-sectional results	Children in all hhs	Children in single parent hhs	Persistence: years in jobless hh <sup>b</sup>	Children in all hhs	Children in single parent hhs
	%	%		%	%
2001	14.7	48.3	Never	76.3	35.1
2002	14.8	48.9	1 year	7.2	12.4
2003	14.4	48.5	2 years	4.1	11.4
2004	14.2	47.2	3 years	3.0	8.3
2005	13.5	44.4	4 years	2.0	5.7
2006	12.7	43.5	5 years	1.2	4.7
2007	12.4	42.0	6 years	3.1	11.1
			7 years	3.1	11.3
				(100.0)	(100.0)

a) Source: Authors' own calculations based on HILDA waves 2001-07. Population-weighted results.

b) In this analysis, children are aged 6 to 15 years in the final wave and 0 to 9 years in the first wave.

Table 4.19 also shows that children living in single parent households are most at risk of living in a jobless household. This risk is substantial with nearly half of all children in single parent households living in a jobless household in 2001. This decreased to just over 40 per cent in 2007. Similarly, persistence of joblessness is higher for this subgroup and about 65 per cent was jobless for at least one year out of the 7-year period under examination. This is consistent with the results found in the tables in Section 4.2, which showed that lone parent households were most at risk of joblessness particularly compared to couple households.

The type of household in which children live can be even further disaggregated. Table 4.20 shows the incidence and persistence of joblessness for children living in single father, single mother and any non-single parent household. Children in the latter group have a very small probability of living in a jobless household and are extremely unlikely to be in a jobless household during all seven years of the observation period. Children living in single mother

households are much less fortunate, more than half of them live in a jobless household in 2001, which decreases to just over 40 per cent in 2007. A somewhat lower incidence is observed for single-father households, but this group is very small and the results regarding persistence reveal a mixed pattern, so we should not put too much weight on this result.

**Table 4.20: Children Under 15 in Jobless Households - Total Population, Single Mother Households, Single Father Households and in all Non-Single Parent Households Combined<sup>a</sup>**

Cross-sectional results	Children in				Years in jobless hh	Children in			
	all hhs %	single mother hhs %	single father Hhs <sup>b</sup> %	non-single parent hhs %		all hhs %	single mother hhs %	single father Hhs <sup>b</sup> %	non-single parent hhs %
2001	14.7	51.0	33.8	5.8	Never	76.3	34.4	40.2	86.5
2002	14.8	49.7	43.5	5.2	1 year	7.2	13.0	8.8	6.0
2003	14.4	49.1	43.8	5.0	2 years	4.1	12.1	6.5	2.3
2004	14.2	49.4	28.6	5.0	3 years	3.0	8.7	5.1	1.7
2005	13.5	46.6	30.6	5.3	4 years	2.0	5.1	10.0	1.1
2006	12.7	44.6	35.9	5.1	5 years	1.2	4.9	3.8	0.3
2007	12.4	42.2	40.8	5.2	6 years	3.1	12.6	1.1	1.1
					7 years	3.1	9.4	24.5	1.1
						(100.0)	(100.0)	(100.0)	(100.0)

a) Source: Authors' own calculations based on HILDA waves 2001-07. Population-weighted results.

b) The numbers in these columns, especially in longitudinal part, are not very precise due to the small sample size. There are only 7 single father households, which have the same composition for all waves.

## 5. Descriptive Multivariate Analysis

This section discusses the results from a few simple descriptive regressions of the incidence and persistence of household joblessness on a number of household and individual characteristics. This allows an assessment of the importance of individual factors while accounting for the effects of a wide range of other characteristics.

### 5.1 Incidence of household joblessness

The first multivariate analysis focuses on the incidence of household joblessness in each given year separately. The sample of analysis contains all individuals from each of the HILDA waves pooled together. Individuals are excluded from this sample if household joblessness is undetermined or if any of the explanatory variables is missing. The only exception to the latter rule is the SF-36 index for mental health. For this variable, an additional dummy is added to indicate missing values, given the very large number of observations for which this variable is missing.

In addition, we exclude all individuals aged under 18 years or over 64 years. Household joblessness for individuals under 18 is largely determined by the characteristics of other household members rather than by their own characteristics since most of them would still be at school full time. For individuals over 64, household joblessness is expected to depend on retirement decisions, which are complex decisions related to health and wealth issues and are beyond the scope of this report.

The variable of interest is whether or not the individual belongs to a jobless household. Up to seven years of observation are available for each individual in the survey. The model is based on a random-effects probit specification, which can be described as follows:

$$Y_{it}^* = \beta' x_{it} + v_{it} + u_i, \quad i = 1, \dots, n, \quad t = 1, \dots, T,$$
$$Y_{it} = 1 \text{ if } Y_{it}^* > 0, \text{ and } 0 \text{ otherwise}$$

where  $Y_{it}^*$  indicates the latent tendency of an individual to be in a jobless household,  $Y_{it}$  is one if individual  $i$  is in a jobless household at period  $t$ ,  $x_{it}$  is a set of individual and household characteristics,  $v_{it}$  is the individual and time varying error term, and  $u_i$  is the individual-specific error term which is constant over time and allows for correlation over time of observations on the same individual. The model is estimated separately for men and women to allow coefficients to differ by gender. In addition, the two alternative definitions of household joblessness described in Section 3 are used in order to assess the sensitivity of the results to the alternative specifications.

The estimated coefficients, together with the associated marginal effects,<sup>15</sup> for females and males are reported in Tables 5.1 and 5.2 respectively. Marginal effects are useful because they allow a direct comparison of the results across models, which is not possible using the coefficients. Two sets of coefficients and marginal effects corresponding to the two definitions of household joblessness are reported. The first definition is based on being non-employed for more than 50 per cent of the time in the previous year according to the calendar questions in the survey. The second definition is based on the responses in the household questionnaire regarding each household member's employment by the reference person in the household.

Comparing the two sets of results in the two tables, the direction and relative importance of the characteristics are mostly similar for the two definitions. When using the household questionnaire based joblessness indicator, more observations are available and as expected the constant term is more negative, indicating a lower incidence of joblessness.

A linear and a quadratic term are included for age to allow for a non-linear relationship between age and the tendency to live in a jobless household. That is, the probability may actually be increasing in age for some individuals and decreasing in age for other individuals depending on their actual age. The effect of age is significant in all specifications and has a U-shape under both definitions of household joblessness. That is, household joblessness is more prevalent at younger and older ages, everything else being equal. Around age 50, the probability of being in a jobless household is at its lowest level for women, independent of the definition of joblessness used. Higher coefficients on squared age for males mean that the U-shape is more pronounced for them than for females. The probability of being in a jobless household is at its lowest at age 36 for the calendar time definition and age 30 for the household questionnaire definition. The marginal effects of age combine the linear and quadratic terms. They show that under both definitions of household joblessness, being one year older increases, on average, the probability of being in a jobless household by 0.2 percentage points for males. For females, the marginal effect is -0.1 percentage point under the first definition and it is negligible under the second definition. The small effects are partly due to the counteracting effects of age in the different age ranges.

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<sup>15</sup> Average marginal effects are presented. These are calculated by changing dummy variables from 0 to 1, increasing discrete variables by one unit and taking the derivative for continuous variable. The marginal effect of a variable is calculated at the observed values for the other variables, keeping these constant. Note that z-values are not reported for the marginal effects of age and work experience. This is because these variables enter the model as a combination of a linear and a quadratic term.

**Table 5.1 Household joblessness, females (random effects probit)**

	Definition based on past year's calendar questions				Definition based on household questionnaire			
	Coef.	z-value	Marg. Eff.	z-value	Coef.	z-value	Marg. Eff.	z-value
Age/10	-1.173	-5.37	-0.001		-0.607	-2.93	0.000	
Age squared/100	0.112	4.56			0.061	2.61		
<i>Education level (reference is &lt;Year 10)</i>								
Year 10, 11 or Cert. I/II	-0.132	-1.34	-0.010	-1.38	-0.166	-1.78	-0.013	-1.86
Year 12	-0.211	-1.83	-0.015	-1.92	-0.348	-3.16	-0.026	-3.45
Cert. III/IV	-0.235	-2.10	-0.017	-2.22	-0.313	-2.97	-0.023	-3.22
Diploma	-0.053	-0.40	-0.004	-0.41	-0.231	-1.83	-0.017	-1.93
University	-0.474	-3.95	-0.032	-4.45	-0.535	-4.70	-0.038	-5.41
Disability	0.368	6.68	0.027	6.22	0.368	6.94	0.027	6.44
Mental health index	-0.006	-4.93	0.000	-4.93	-0.006	-4.86	0.000	-4.86
Missing mental health index	-0.527	-4.79	-0.033	-5.39	-0.579	-5.46	-0.036	-6.21
Indigenous	0.549	3.32	0.042	3.00	0.634	4.05	0.050	3.58
Non-English speaking background	0.438	4.83	0.032	4.45	0.335	3.90	0.025	3.65
Student	-0.539	-3.56	-0.033	-4.02	-0.098	-0.70	-0.007	-0.71
Retired	0.862	13.26	0.071	10.92	1.034	16.48	0.091	13.11
Work experience in years/10	0.727	4.57	-0.039		0.279	1.91	0.017	
Work experience squared/100	-0.445	-1.57			0.052	0.20		
Prop. of time unemployed since FT education	0.281	1.18	0.019	1.18	0.197	0.84	0.014	0.84
Prop. of time not in work since FT education	3.963	16.77	0.272	16.93	2.598	12.64	0.180	12.51
<i>Household type (reference is couple)</i>								
Lone parent	1.420	9.95	0.104	7.37	1.361	10.03	0.099	7.40
Related family and group households	1.471	8.44	0.109	6.20	1.490	9.02	0.112	6.50
Lone person	1.819	12.25	0.147	8.54	1.765	12.62	0.144	8.70
Multi-family household	1.232	9.11	0.086	7.01	1.401	10.65	0.103	7.87
No. of resident children	-0.221	-6.96	-0.015	-6.97	-0.274	-8.87	-0.019	-8.91
No. of resident children under 5	0.697	12.99	0.048	12.82	0.799	15.27	0.056	14.90
Newly partnered	0.388	2.56	0.029	2.37	0.471	3.19	0.036	2.90
Divorce/separation	0.291	2.85	0.021	2.70	0.199	1.99	0.014	1.91
Not in major city	0.101	1.66	0.007	1.63	0.122	2.09	0.009	2.03
SEIFA index decile	-0.046	-4.37	-0.003	-4.38	-0.044	-4.33	-0.003	-4.34
Income support recipient	1.300	26.22	0.108	17.83	1.465	29.69	0.129	19.72
Partner	-1.392	-5.67	-0.114	-7.97	-1.861	-7.71	-0.155	-12.92
Partner's age	0.043	10.59	0.003	10.47	0.052	13.10	0.004	13.08
<i>Partner's education level (ref. is &lt;Year 10)</i>								
Year 10, 11 or Cert. I/II	-0.349	-2.66	-0.036	-2.88	-0.162	-1.27	-0.020	-1.33
Year 12	-0.327	-1.97	-0.034	-2.13	-0.166	-1.04	-0.020	-1.08
Cert. III/IV	-0.433	-3.49	-0.044	-3.88	-0.270	-2.27	-0.033	-2.43
Diploma	-0.302	-1.85	-0.031	-1.99	-0.105	-0.67	-0.013	-0.69
University	-0.324	-2.24	-0.034	-2.43	-0.192	-1.37	-0.024	-1.44
Constant	-2.428	-5.92			-2.793	-7.13		

Note: A z-value above 2.58 indicates significance below the 1% level, a value above 1.96 indicates significance below the 5% level, and a value above 1.64 indicates significance below the 10% level.

**Table 5.2 Household joblessness, males (random effects probit)**

	Definition based on past year's calendar questions				Definition based on household questionnaire			
	Coef.	z-value	Marg. Eff.	z-value	Coef.	z-value	Marg. Eff.	z-value
Age/10	-1.753	-6.02	0.002		-1.034	-3.83	0.002	
Age squared/100	0.246	7.69			0.173	5.83		
<i>Education level (reference is &lt;Year 10)</i>								
Year 10, 11 or Cert. I/II	-0.477	-4.27	-0.023	-4.81	-0.332	-3.20	-0.017	-3.47
Year 12	-0.562	-4.40	-0.027	-5.03	-0.518	-4.32	-0.026	-4.90
Cert. III/IV	-0.468	-4.30	-0.023	-4.82	-0.380	-3.74	-0.019	-4.11
Diploma	-0.397	-2.84	-0.020	-3.13	-0.329	-2.53	-0.017	-2.74
University	-0.547	-4.22	-0.027	-4.85	-0.473	-3.88	-0.024	-4.37
Disability	0.437	7.07	0.021	6.45	0.322	5.42	0.016	5.09
Mental health index	-0.005	-3.27	0.000	-3.28	-0.006	-4.43	0.000	-4.46
Missing mental health index	-0.346	-2.88	-0.015	-3.09	-0.531	-4.59	-0.023	-5.16
Indigenous	0.310	1.63	0.015	1.52	0.314	1.76	0.016	1.64
Non-English speaking background	0.409	4.18	0.019	3.83	0.255	2.76	0.012	2.61
Student	0.032	0.21	0.001	0.21	0.225	1.63	0.011	1.54
Retired	1.128	14.46	0.069	10.29	1.281	16.89	0.089	11.41
Work experience in years/10	0.890	4.08	-0.059		0.231	1.18	-0.057	
Work experience squared/100	-1.536	-4.57			-0.559	-1.83		
Prop. of time unemployed since FT education	0.715	2.91	0.032	2.91	0.438	1.90	0.021	1.90
Prop. of time not in work since FT education	4.223	15.37	0.187	16.26	2.350	10.24	0.110	10.38
<i>Household type (reference is couple)</i>								
Lone parent	1.030	6.96	0.047	5.47	0.922	6.84	0.044	5.51
Related family and group households	1.430	9.37	0.074	6.57	1.255	8.93	0.066	6.57
Lone person	1.593	11.78	0.087	7.92	1.474	12.08	0.084	8.38
Multi-family household	0.558	3.33	0.023	2.94	0.888	5.85	0.042	4.76
No. of resident children	-0.239	-6.32	-0.011	-6.29	-0.340	-9.06	-0.016	-9.06
No. of resident children under 5	0.605	9.27	0.027	8.92	0.598	9.36	0.029	8.98
Newly partnered	0.093	0.58	0.004	0.57	-0.106	-0.64	-0.005	-0.65
Divorce/separation	-0.211	-1.49	-0.009	-1.55	-0.261	-1.92	-0.012	-2.03
Not in major city	0.162	2.48	0.007	2.40	0.092	1.49	0.004	1.46
SEIFA index decile	-0.045	-3.96	-0.002	-3.96	-0.062	-5.73	-0.003	-5.74
Income support recipient	1.416	24.22	0.089	15.09	1.792	30.05	0.140	17.31
Partner	1.142	4.55	0.058	3.55	0.905	3.88	0.047	3.15
Partner's age	-0.005	-1.08	0.000	-1.09	-0.002	-0.48	0.000	-0.48
<i>Partner's education level (ref. is &lt;Year 10)</i>								
Year 10, 11 or Cert. I/II	-0.339	-2.64	-0.012	-2.84	-0.275	-2.28	-0.011	-2.42
Year 12	-0.263	-1.75	-0.010	-1.85	-0.372	-2.57	-0.015	-2.79
Cert. III/IV	-0.694	-4.36	-0.023	-5.14	-0.441	-3.05	-0.017	-3.37
Diploma	-0.360	-2.00	-0.013	-2.16	-0.287	-1.69	-0.011	-1.80
University	-0.925	-5.69	-0.030	-7.02	-0.656	-4.39	-0.024	-5.06
Constant	-1.838	-3.77			-1.990	-4.38		

Note: A z-value above 2.58 indicates significance below the 1% level, a value above 1.96 indicates significance below the 5% level, and a value above 1.64 indicates significance below the 10% level.

A higher level of educational attainment has the expected negative effect on household joblessness for males and females, using either definition of joblessness. Having a university degree has the strongest negative effect (between 2.4 and 3.8 percentage points decrease). The effect of having a diploma has a smaller effect and, for women, it is not significant under the first definition and only significant at the ten per cent level under the second definition. Having completed Year 10, 11 or a Certificate also reduces the probability of being in a jobless household, although again not significantly for women under the first joblessness definition (and only at the ten per cent level under the second definition). For males, the impact of completing Year 12 is comparable in size to a university degree in terms of reducing the probability of being in a jobless household, and all effects are more similar across education levels than for women. A potential explanation for this is that men are likely to participate in the labour market independent of whether they have finished a higher education level or not, whereas female participation depends more on their investment in human capital. In high-demand labour markets as observed between 2001 and 2007, there is demand for a range of skill levels with perhaps only the lowest level (less than Year 10) having difficulties in finding a job.

Having a disability<sup>16</sup> increases the probability of household joblessness in all four models, with the effects being slightly larger for females than for males. Bad mental health has a negative significant effect on the probability of household joblessness under both definitions for both males and females. That is, people with mental health problems (as reflected by a low score on the mental health index) are more likely to be part of a jobless household. However, the marginal effects show that these effects are very limited in size. A 10 unit increase in the index (ranging from 0 to 100) has an effect of a less than 0.5 percentage point decrease in joblessness. In addition, we have included a dummy variable indicating whether the mental health variable was missing. The aim was to avoid a large reduction in sample size since a relatively large proportion of respondents did not fill out the self completion questionnaire (SCQ) in which the mental health question was included. The results show that a missing mental health variable has a negative and significant effect on household joblessness, possibly indicating better mental health status for this subgroup compared to the group who completed the SCQ.

Being from a non-English speaking background significantly increases the probability of being in a jobless household for males and females, under both joblessness definitions, although the effect is larger under the first definition. In addition, for a given definition, the effect is larger for females than for males. Being from an indigenous background significantly increases the probability of household joblessness for females under both joblessness definitions but the effect is not significant for males. Section 4 showed that very few

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<sup>16</sup> Having a disability is defined as having a work-limiting long-term health condition.

individuals of indigenous descent are included in the sample, so the estimated effect is based on a small number of observations.

For females, being a student has a negative and significant effect under the first definition, reducing on average the probability of household joblessness by 3.3 percentage points, but the effect is not significant under the second definition. The definition of 'student' differs in these two cases to maintain consistency with the definition of joblessness being used. Under the first definition, students are those who have been full-time student for more than 50 per cent of the time in the last twelve months. The second definition makes use of household-level information which is less detailed in this regard. Under the latter definition, only non-working students at the time of the interview can be recorded as student. For males, the effect is not significant. A potential explanation for the difference between men and women is that male students may be more likely to be in a jobless household than female students because they are more likely to have left the parental home while female students tend to still live with their (working) parents.<sup>17</sup>

As expected, being retired has a positive and significant effect on the probability of the individual being a member of a jobless household for males and females under both definitions of household joblessness. The marginal effects range from 6.9 percentage points for males under the first definition to 9.1 percentage points for females under the second definition.

We discuss the variables related to the individual's labour market history next. The effect of work experience (in years) is significant for females (although squared work experience is insignificant) and for males when using the first definition. For men, the effect tends to have an inverted U-shape as indicated by the negative coefficient on squared work experience. That is, both high and low levels of work experience are associated with lower probabilities of household joblessness. For men, the turnaround point occurs after three years of work experience under the first joblessness definition and after two years under the second definition. That is, after two to three years of work experience, the probability of household joblessness decreases when work experience increases further. As for age, the marginal effects associated with work experience combine the effects of the linear and the quadratic term. They show that, on average over the sample, the probability of household joblessness decreases by between 5.7 and 5.9 percentage points per additional year of work experience for males, depending on the joblessness definition. For females, the marginal effects are smaller at 3.9 percentage points under the first definition and reversed under the second definition. That is, an additional year of work experience increases the probability of household

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<sup>17</sup> The data seem to indicate that this is true but to a small extent only.

joblessness by 1.7 percentage points. The positive sign of the marginal effect is an unexpected result.

The latter results have to be interpreted together with the effects of unemployment and the time spent out of work, which are at least to some extent correlated with the work experience variable. For males and females under both joblessness definitions, the proportion of time spent not in work since completing full-time education has a positive significant effect on the probability of household joblessness. The marginal effects show that an increase by one percentage point in the proportion of time not in work increases the probability of household joblessness by about 0.27 percentage points for females under the first definition and 0.18 percentage points under the second definition. For males, the marginal effects are 0.19 and 0.11 percentage points respectively.

The effects of the proportion of time spent in unemployment are much smaller. In addition, they are only significant for males. The effect is significant for males at the one per cent level under the first joblessness definition and at the 10 per cent level under the second definition. An increase by one percentage point in the proportion of time in unemployment increases the probability of household joblessness by about 0.03 percentage points for males under the first definition and 0.02 percentage points under the second definition. When interpreting this result, the coefficient needs to be combined with the effect of having a larger proportion of time not in work since leaving full-time education (since unemployment is also counted as time not in work). That is, an increase in the proportion of time in unemployment increases the probability of joblessness slightly more than an increase in the proportion of time not in work for men, but not for women.

The type of household in which the individual lives has a large and significant impact on the probability of household joblessness. Compared to couples (the reference group), belonging to any other household type increases the probability of household joblessness for both males and females regardless of the joblessness definition. The strongest positive effect is found for lone person households, for both males and females regardless of the definition. It could be argued that the presence of another adult in the household mathematically reduces the probability of household joblessness. That is, there is a higher probability of at least having one person in employment. The effects of household structure are particularly large for females. Under the first joblessness definition, being a lone parent or a lone person compared to being in a couple increases, on average, the probability of household joblessness by 10.4 and 14.7 percentage points respectively. The corresponding effects for males are 'only' 4.7 and 8.7 percentage points. This may indicate that in couple households, the joblessness status depends more on the male than the female employment status, because of higher male participation rates.

The total number of children in the household has a significant negative effect on the probability of household joblessness for males and females under both definitions. Perhaps the presence of more children in the older age groups improves the chances of at least one person finding employment and so avoiding household joblessness. The marginal effects show very little sensitivity to the joblessness definition. However, for families with preschool children these negative effects have to be combined with the larger positive and significant effects of the number of children under five years old. The effect is smaller for males than for females. For females, an additional child under five years increases the probability of household joblessness by 3.3 percentage points under the first definition and 3.7 under the second definition.<sup>18</sup> For males, the marginal effects are 1.6 and 1.3 percentage points respectively.

Not living in a major city increases the probability of household joblessness by 0.7 percentage points under the first joblessness definition but the effect is only significant for males. However, under the second definition, the effect of 0.9 percentage points is only significant for females. Using the regional indicator for disadvantage, the SEIFA index, we find a negative and significant effect on the probability of household joblessness, regardless of gender or the joblessness definition being used. On average, the probability of household joblessness decreases by 0.3 percentage points with an increase in the SEIFA index from one decile to the next, for females and males under the second definition. Under the first definition, the marginal effect is also 0.3 percentage points for females but slightly lower for males at 0.2 percentage points.

For females, the effect of having a partner is to reduce the probability of household joblessness by a substantial margin. Under the first joblessness definition, the probability of household joblessness is reduced by 11 percentage points, while the reduction is 16 percentage points under the second definition. The effect of having a partner is opposite and smaller for males, increasing the household joblessness probability by 5.8 percentage points under the first definition and 4.7 percentage points under the second definition. The effects are significant under both joblessness definitions. This dummy variable is distinct from the household type variable in that it distinguishes the adult partners in a couple household from their children over 18 years of age, as well as couples within multi-family households. The results seem to indicate that males are generally working thus improving the chances of women with a partner whereas females are more often non-participants and therefore contribute less to reducing the probability of household joblessness. Furthermore, the group of men without a partner, in addition to including single person households, includes men living with their parents in a couple household. Men with a partner are more likely to be part of a

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<sup>18</sup> To obtain these marginal effects, the marginal effects associated with an additional child have to be combined with those associated with an additional child under five years old.

smaller couple household (that is, without children) which increases their household joblessness probability. Since having a partner potentially identifies this group of smaller households within couple families, the variable could have a positive effect on the probability of household joblessness.

For those who have a partner, the overall effect of the partner depends on the partner's age and education level. For females, the probability of household joblessness increases (by 0.3 to 0.4 percentage points per year) with the partner's age (possibly indicating the effect of retirement decisions), whereas for men the effect of the partner's age is not significant. The lack of effect for men may be due to the fact that they are often older than their partners so that their own age drives the retirement decision. For females, the effect of the partner's education dummies are only significant under the first definition of household joblessness (except for Certificate III/IV which is also significant under the second definition). These significant effects are larger than the effects of their own education. Compared to the reference group (that is, less than Year 10), higher levels of the partner's education reduce household joblessness probabilities by up to 4.4 percentage points if the partner has a Certificate III or IV. For males, results are more comparable under both definitions. Compared to the reference group, having a partner who has completed Year 10 or 11, or who has a Certificate or a university degree reduces the probability of household joblessness by between 1 and 3 percentage points. Interestingly, the effect of the partner's university degree is larger than the effect of their own degree.

For females, changes in household structure significantly increase the probability of household joblessness during the year they occur, independent of whether they acquire a new partner or separate from an old partner. The effect of moving in with a new partner is opposite to what would be expected for females, but combined with the effect of having a partner it may indicate that compared to those who have had a partner for a longer time, the probability of household joblessness is higher for those who are newly partnered. These effects are not significant for males, the only exception being the negative effect of a separation under the second joblessness definition. The explanation for this effect may be similar to the explanation of the effect of moving in with a partner for women. That is, combined with the effect of having a partner it may indicate that compared to longer-term single persons, the probability of household joblessness is lower for those who are newly separated.

Finally, as expected both males and females on income support are significantly more likely to live in a jobless household, regardless of the definition. Under the first definition, being on income support increases, on average, the probability of household joblessness by 10.8 and 8.9 percentage points for females and males respectively. Under the second definition, the effects are larger at 12.9 and 14.0 percentage points for females and males respectively.

## **5.2 Persistence in household joblessness**

This section focuses on the persistence of household joblessness. The variable of interest is the number of years in a jobless household during the seven years of the HILDA survey used in this report. Hence, possible values range from zero to seven. Only individuals for whom there is information on household joblessness across the seven years are retained. In addition, we only retain individuals who are under the Age Pension age in each of these years.<sup>19</sup> The multivariate analysis is based on an ordered probit specification. Explanatory variables included in the analysis are similar to those used in Section 5.1. However, dummy variables which may change over time are defined so that they reflect the number of years in a particular state or condition across the seven waves of HILDA. For example, the dummy variable indicating the student status for any given year is replaced by the number of years each individual was a full-time student during the seven waves of the HILDA. Continuous or discrete variables which may change over time are also adapted. The continuous variable SEIFA index is replaced by two variables: one variable indicating the number of years in the top quintile and another variable indicating the number of years in the bottom quintile. The mental health index is replaced by the number of years with mental health problems; that is, with a mental health index below 60.

Tables 5.3 and 5.4 report the results for men and women based on the two alternative definitions for household joblessness as defined in Section 5.1. The average marginal effects are also presented. In an ordered probit specification with eight outcomes, each variable is associated with eight marginal effects, one for each outcome. In order to simplify the interpretation of the results, the marginal effects are computed in terms of expected years in a jobless household, so that there is only one marginal effect for each variable.<sup>20</sup> A marginal effect of one means that a marginal increase in the corresponding variable increases, on average for the whole sample, the expected number of years in a jobless household by one.

In contrast to the results of the previous section, many coefficients are not significant. The effect of age is not significant for females. For males, only the linear term is significant at the ten per cent level under the second definition of household joblessness. However, the effect now has an inverted U-shape, which means that persistence of household joblessness first increases with age up to the age of 53 years before decreasing at older ages. The associated marginal effect is relatively small. On average for the men in the sample, being one year older increases the persistence of household joblessness by about 0.7 per cent of a year, or slightly less than three days.

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<sup>19</sup> This means men in the sample were aged under 58 years in the first wave and women in the sample were aged under 55 years in the first wave.

<sup>20</sup> However, the downside of this approach is that it is cumbersome to compute the standard errors of the marginal effects, which is why z-values are not presented. However, the z-values on the coefficients are an indication of the significance of the marginal effects as well.

**Table 5.3 Persistence of household joblessness, females (ordered probit)**

	Definition based on past year's calendar questions			Definition based on household questionnaire		
	Coef.	z-value	Marg. eff.	Coef.	z-value	Marg. eff.
Age/10	0.219	0.65	-0.006	0.059	0.19	-0.002
Age squared/100	-0.040	-0.94		-0.012	-0.31	
<i>Education level (reference is &lt;Year 10)</i>						
Year 10, 11 or Cert. I/II	0.027	0.24	0.017	0.054	0.54	0.033
Year 12	0.030	0.23	0.018	-0.013	-0.12	-0.008
Cert. III/IV	0.025	0.19	0.016	0.035	0.28	0.021
Diploma	0.152	1.07	0.097	0.102	0.77	0.064
University	-0.156	-1.15	-0.090	-0.154	-1.26	-0.089
Disability (no. of years)	0.038	2.36	0.023	0.027	1.80	0.016
Low mental health (no. of years)	0.041	2.33	0.025	0.049	3.04	0.030
Missing mental health index (no. of years)	0.016	0.45	0.010	0.019	0.64	0.012
Indigenous	0.323	1.82	0.216	0.255	1.62	0.166
Non-English speaking background	0.287	2.87	0.186	0.183	1.96	0.115
Student (no. of years)	0.057	1.25	0.035	0.293	5.78	0.193
Retired (no. of years)	0.287	10.70	0.190	0.315	12.66	0.209
Work experience in years/10	-0.071	-0.33	0.007	-0.040	-0.20	0.006
Work experience squared/100	0.063	1.48		0.049	1.27	
Prop. of time unemployed since FT education	0.328	1.11	0.002	0.503	1.84	0.003
Prop. of time not in work since FT education	0.843	3.09	0.005	0.643	2.54	0.004
<i>No. of years in household type (ref. is 7 years as couple)</i>						
Lone parent	0.153	3.52	0.097	0.109	2.84	0.068
Rel. fam., group and multi-fam. Households	0.096	1.95	0.060	0.074	1.64	0.045
Lone person	0.172	3.95	0.110	0.152	3.91	0.096
Not in major city (no. of years)	0.024	2.32	0.015	0.017	1.79	0.011
SEIFA top quintile (no. of years)	0.014	0.98	0.009	0.022	1.64	0.013
SEIFA bottom quintile (no. of years)	0.029	2.27	0.018	0.034	2.82	0.020
No. of resident children	-0.147	-3.91	-0.085	-0.113	-3.43	-0.065
No. of resident children under 5	0.334	5.39	0.224	0.297	5.22	0.196
Had a child during Hilda	0.187	2.32	0.117	0.332	4.68	0.210
Income support recipient (no. of years)	0.291	18.53	0.193	0.276	18.93	0.181
No. of years with a partner	0.007	0.16	0.004	-0.021	-0.53	-0.013
Partner's age	0.009	2.78	0.006	0.012	4.01	0.007
<i>Partner's education level (ref. is &lt;Year 10)</i>						
Year 10, 11 or Cert. I/II	-0.294	-2.13	-0.177	-0.352	-2.78	-0.212
Year 12	-0.218	-1.31	-0.135	-0.230	-1.52	-0.144
Cert. III/IV	-0.347	-2.71	-0.206	-0.302	-2.64	-0.185
Diploma	-0.026	-0.15	-0.017	-0.005	-0.03	-0.003
University	-0.064	-0.44	-0.042	-0.322	-2.36	-0.196
Bound 1	2.810			2.468		
Bound 2	3.315			2.989		
Bound 3	3.706			3.368		
Bound 4	4.004			3.672		
Bound 5	4.284			3.986		
Bound 6	4.545			4.327		
Bound 7	5.038			4.804		

Note: A z-value above 2.58 indicates significance below the 1% level, a value above 1.96 indicates significance below the 5% level, and a value above 1.64 indicates significance below the 10% level. Bounds 1 to 7 are threshold values: if the total value of the sum of the coefficients multiplied by the variable values for an individual is lower than the value for bound 1, the individual is predicted to be in a jobless household for 0 years, if the value is in between bound 1 and 2, the individual is predicted to be in a jobless household for 1 year, etc.

**Table 5.4 Persistence of household joblessness, males (ordered probit)**

	Definition based on past year's calendar questions			Definition based on household questionnaire		
	Coef.	z-value	Marg. eff.	Coef.	z-value	Marg. eff.
Age/10	0.426	0.92	0.001	0.733	1.71	0.007
Age squared/100	-0.048	-0.85	0.001	-0.069	-1.32	
<i>Education level (reference is &lt;Year 10)</i>						
Year 10, 11 or Cert. I/II	-0.162	-1.19	-0.077	-0.166	-1.31	-0.081
Year 12	-0.228	-1.46	-0.106	-0.354	-2.42	-0.162
Cert. III/IV	-0.206	-1.54	-0.096	-0.123	-1.01	-0.061
Diploma	-0.249	-1.49	-0.114	-0.147	-0.97	-0.072
University	-0.005	-0.03	-0.002	-0.096	-0.68	-0.048
Disability (no. of years)	0.060	3.04	0.028	0.033	1.77	0.015
Low mental health (no. of years)	0.045	2.32	0.020	0.043	2.39	0.020
Missing mental health index (no. of years)	0.047	1.41	0.022	0.005	0.15	0.002
Indigenous	-0.012	-0.04	-0.006	0.087	0.31	0.041
Non-English speaking background	0.342	2.78	0.171	0.208	1.81	0.103
Student (no. of years)	0.224	4.72	0.109	0.436	7.20	0.239
Retired (no. of years)	0.280	9.09	0.140	0.305	10.60	0.159
Work experience in years/10	-0.070	-0.24	0.006	-0.364	-1.35	0.000
Work experience squared/100	0.470	0.91	0.006	0.085	1.79	
Prop. of time unemployed since FT education	1.248	3.90	0.006	1.014	3.36	0.005
Prop. of time not in work since FT education	0.637	2.00	0.003	0.434	1.46	0.002
<i>No. of years in household type (ref. is 7 years as couple)</i>						
Lone parent	0.055	1.33	0.026	0.054	1.46	0.025
Rel. fam., group and multi-fam. Households	0.111	2.62	0.052	0.089	2.31	0.043
Lone person	0.110	3.08	0.052	0.104	3.26	0.050
Not in major city (no. of years)	0.040	3.39	0.018	0.017	1.60	0.008
SEIFA top quintile (no. of years)	-0.018	-1.01	-0.008	-0.003	-0.21	-0.002
SEIFA bottom quintile (no. of years)	0.018	1.25	0.008	0.033	2.51	0.015
No. of resident children	-0.147	-3.14	-0.063	-0.156	-3.73	-0.068
No. of resident children under 5	0.285	3.68	0.143	0.306	4.31	0.160
Had a child during Hilda	-0.017	-0.18	-0.008	-0.048	-0.55	-0.022
Income support recipient (no. of years)	0.268	13.88	0.134	0.255	14.18	0.130
No. of years with a partner	0.017	0.43	0.008	-0.015	-0.43	-0.007
Partner's age	-0.004	-0.98	-0.002	-0.001	-0.22	0.000
<i>Partner's education level (ref. is &lt;Year 10)</i>						
Year 10, 11 or Cert. I/II	-0.047	-0.33	-0.022	0.000	0.00	0.000
Year 12	-0.070	-0.42	-0.032	0.000	0.00	0.000
Cert. III/IV	0.006	0.03	0.003	0.049	0.30	0.024
Diploma	-0.004	-0.02	-0.002	0.221	1.31	0.113
University	-0.332	-1.96	-0.139	-0.269	-1.72	-0.114
Bound 1	2.872			3.053		
Bound 2	3.373			3.626		
Bound 3	3.701			3.961		
Bound 4	4.070			4.336		
Bound 5	4.400			4.662		
Bound 6	4.683			4.975		
Bound 7	5.184			5.522		

Note: A z-value above 2.58 indicates significance below the 1% level, a value above 1.96 indicates significance below the 5% level, and a value above 1.64 indicates significance below the 10% level. Bounds 1 to 7 are threshold values: if the total value of the sum of the coefficients multiplied by the variable values for an individual is lower than the value for bound 1, the individual is predicted to be in a jobless household for 0 years, if the value is in between bound 1 and 2, the individual is predicted to be in a jobless household for 1 year, etc.

Interestingly, educational attainment does not have any significant effect on the persistence of household joblessness, although all education dummies have the right sign for males with some of these close to significance at the ten per cent level under the first definition and the effect of Year 12 significant at the five per cent level under the second definition. Perhaps a potential explanation is that education affects joblessness at one point in time, and it may distinguish those who are never jobless from those who are jobless for at least one year. However, it may not distinguish very well those who are jobless for two years from those who are jobless for four years. As a result, the relationship between education and persistence is not as strong as between education and joblessness at one point in time.

The number of years in disability significantly increases the persistence of household joblessness. Mental health problems are also associated with significantly higher levels of persistence in household joblessness.

Being from a non-English speaking background significantly increases the persistence of household joblessness. Under the first definition, being from a non-English speaking background increases the persistence of household joblessness by 18.6 and 17.1 per cent of a year for females and males respectively, while under the second definition the marginal effects are smaller at 11.5 and 10.3 percentage points for females and males respectively. Being from an indigenous background does not significantly affect the persistence of household joblessness, except at the ten per cent level for females under the first definition. In this latter case, persistence is increased by 21.6 per cent of a year. As mentioned before, the group of respondents in the sample from indigenous descent is small.

The number of years spent as a full-time student over the last seven years increases the persistence of household joblessness over the same period for males and females. However for females, the effect is not significant under the first definition. Similarly, each additional year in retirement significantly increases the persistence of household joblessness for males and females under both definitions. The marginal effects show that an additional year in retirement increases the persistence of household joblessness by 14.0 and 15.9 per cent of a year for males, under the first and second definition respectively. The effects of an extra year spent as a full-time student are 10.9 and 23.9 per cent of a year respectively.

Turning to the labour market history variables, the effect of work experience is mostly insignificant. The proportion of time not in work since completing full-time education significantly increases persistence, the only exception being for males under the second definition where the positive effect is not significant. The effects are slightly larger for females, for whom an increase in the proportion of time in not in work by one percentage point increases the persistence of household joblessness by 0.4 to 0.5 per cent of a year, on average.

The additional effect of the proportion of time spent in unemployment since completing full-time education is significant for males at the one percent level under both definitions and it increases persistence as expected. The associated marginal effects indicate that an increase in the proportion of time in unemployment by one percentage point increases the persistence of household joblessness by 0.5 to 0.6 per cent of a year, on average. For females, the effect is only significant at the ten per cent level under the second definition.

For males and females under both specifications, household type affects the persistence of household joblessness. Females living in single adult households with or without children show higher persistence in household joblessness than other females. For example, each additional year spent as a lone person increases the persistence of household joblessness by 11.0 and 9.6 per cent of a year under the first and second joblessness definition respectively. By comparison, the corresponding marginal effects for males are 5.2 and 5.0 per cent of a year. Overall, men and women not living in a couple household (the reference group) experience higher household joblessness persistence, and the effects are larger for females than for males.

Females living outside major cities for more years have higher persistence levels of household joblessness. The effect is similar for males, although it is not significant under the second definition. The effect of the regional disadvantage measure, the SEIFA index, is mostly insignificant for males. However, using the second definition of household joblessness, the number of years lived in a low SEIFA index area increases persistence and the effect is significant at the five per cent level. A similar effect is found for females under both definitions. The number of years lived in a high SEIFA area has the counterintuitive effect of increasing persistence in household joblessness for females but the effect is not significant.

The effect of the number of children is significant and consistent with those found in Section 5.1. The number of children has a negative effect on persistence but the effect of the presence of children under five years old in the household is positive and larger than the latter. The marginal effects indicate that, as expected, the presence of a child under five years has larger effects for females than for males (13.1 to 13.9 per cent of a year compared to 8.0 to 9.2 per cent of a year). In addition, having a newborn child in the household in one of the seven years significantly increases the persistence for females (with 12 to 21 per cent of a year) but not for males.

Although the number of years spent with a partner has no effect on household joblessness persistence, the latter is affected by age and education of the partner for female members of a couple. For females, persistence increases with the partner's age and there is a tendency for persistence to decrease with the partner's education, although there is no regular pattern of decrease with the level of education. None of the effects are significant for male members

with the exception of the negative effect on joblessness persistence of having a partner with a university degree.

Each additional year on income support increases the persistence of household joblessness by 19.3 and 13.4 per cent of a year under the first definition for females and males respectively. The effects are similar under the second definition at 18.1 and 13.0 per cent of a year for females and males respectively.

## 6. Dynamic Multivariate Analysis

State dependence describes the process whereby an individual is more likely to be in state X (in this case: to be living in a jobless household) in period t+1 if he/she was in state X in period t. This is independent of any characteristics they may have. However, being in state X for a number of subsequent periods could also be explained by unobserved characteristics (unobserved heterogeneity) which increase the probability of living in a jobless household.

The approach used in this section allows us to distinguish between these two explanations for long-term household joblessness. This distinction is important for policy development purposes since different strategies would be required to deal with household joblessness. If state dependence is the main cause of household joblessness, breaking the cycle of joblessness, preferably early in the cycle, is important. If unobserved characteristics appear the main cause, the first action required is further investigation to discover what these unobserved characteristics might be. Once this is known, policy makers can determine what types of policies, if any, might be effective. Section 6.1 describes the econometric model, followed by a discussion of the results in Section 6.2.

### 6.1 The Model

We estimate a dynamic random effects probit model to explore the persistence of household joblessness. Persistence or state dependence,  $\gamma$ , is defined as the extent to which household joblessness in one year increases the probability of household joblessness in the following year. The model, to be estimated here, accounts for the endogeneity of the initial conditions, while controlling for differences in observed and unobserved characteristics between individuals (observed and unobserved heterogeneity). The approach suggested by Heckman (1981) is implemented to deal with the initial conditions problem in the dynamic random effects probit model.

The probability for individual  $i$  to be in a jobless household at time  $t$  ( $Y_{it}$ ), for  $t > 0$ , is a function of household joblessness at time  $t-1$  ( $Y_{i,t-1}$ ) and a series of observable characteristics ( $X_{it}$ ):

$$Y_{it}^* = \gamma Y_{i,t-1} + \beta' X_{it} + v_{it}, \quad t > 0 \quad (1)$$

$$Y_{it} = \begin{cases} 1 & \text{if } Y_{it}^* \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

where  $Y_{it}^*$  is the underlying latent variable for observed household joblessness ( $Y_{it}$ ).  $X_{it}$  is a vector of observed variables (containing age, age squared, education level, SEIFA index, living in a city, disability, mental health, household type, presence of children, having a partner, being retired and being a full-time student) which may affect joblessness ( $Y_{it}$ ) but which are uncorrelated with the error term  $v_{it}$ . In a dynamic model,  $\gamma$  (representing state dependence) is a parameter to be estimated, while static models restrict  $\gamma$  to be equal to 0. Repeated observations for a given group of individuals over time allow us to construct a model in which individuals may differ in their propensity to being a member of a jobless household. Such individual (unobserved) heterogeneity is specified in estimation by decomposing the error term  $v_{it}$  into two separate terms: a constant component for each individual and a time-varying component. This is written as:

$$v_{it} = \alpha_i + u_{it} \quad (2)$$

where  $\alpha_i$  is an individual-specific and time-invariant random component, assumed to be normally distributed, having zero mean and variance  $\sigma_\alpha^2$ , and  $u_{it}$  is a time- and individual-specific disturbance, assumed to be a serially independently distributed standard normal, which is uncorrelated with  $X_{it}$  and  $\alpha_i$ .

Thus, we estimate a random effects dynamic probit model of being a member of a jobless household ( $Y_{it}$ ), which is specified as:

$$Y_{it}^* = \gamma Y_{i,t-1} + \beta' X_{it} + \alpha_i + u_{it} \quad (3)$$

$$Y_{it} = \begin{cases} 1 & \text{if } Y_{it}^* \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

Since the total error term ( $v_{it} = \alpha_i + u_{it}$ ) of the model is correlated over time due to the individual-specific time-invariant  $\alpha_i$  component, we have:

$$\rho = \text{Corr}(v_{it}, v_{is}) = \frac{\sigma_\alpha^2}{\sigma_\alpha^2 + \sigma_u^2} \quad t, s = 1, \dots, T \quad \text{and} \quad t \neq s \quad (4)$$

where  $\rho$  measures the proportion of the total variance contributed by the individual-level (or panel-level) variance component. Based on this statistic, a likelihood ratio test can be constructed to test the null hypothesis that  $\rho = 0$ , which tests for the presence of unobserved heterogeneity. If  $\rho$  is zero, the panel-level variance component is not important. That is, the panel estimator would not be different from a pooled estimator, in which no account is taken of individual-specific unobserved differences. In addition, although the random effects model

assumes  $\alpha_i$  to be uncorrelated with  $X_{it}$ , we also add  $\bar{x}_i$ , which is the average of the observations on some of the exogenous variables over the sample period, as regressors to the model in the actual estimation (Mundlak, 1978). This is aimed at controlling for the potential correlation between  $\alpha_i$  and  $X_{it}$ .

We now turn to a potential source of bias arising from the initial conditions problem. The presence of state dependence in the form of a lagged dependent variable  $Y_{i,t-1}$  introduces what is called an initial conditions problem. This is caused by our lack of knowledge of the data-generating process governing the initial household joblessness outcome. If the individual initial conditions are correlated with the  $\alpha_i$ , the estimator will be inconsistent and tend to overestimate  $\gamma$  (that is, overstate the extent of state dependence). Heckman (1981) therefore suggested that the initial household joblessness states are approximated by a reduced-form equation:

$$Y_{i0}^* = \beta_0' Z_{i0} + \mu_{i0} \quad (5)$$

$$Y_{i0} = \begin{cases} 1 & \text{if } Y_{i0}^* \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

That is, to account for the endogeneity of the initial conditions, household joblessness in the first time period  $t=0$  ( $Y_{i0}$ ) depends on a set of individual characteristics as measured in the first wave,  $Z_{i0}$ , which includes the variables in  $X_{it}$  as measured in the first period, work experience in years and squared work experience, the proportion of time spent in unemployment since completing full-time education, the proportion of time not in work since completing full-time education and whether or not individual  $i$  is from a non-English speaking background.  $\mu_{i0}$  is the standard normal distribution and correlated with  $\alpha_i$ , but uncorrelated with  $u_{it}$  for  $t \geq 1$ . Using an orthogonal projection, the latter can be written as  $\mu_{i0} = \theta\alpha_i + u_{i1}$ , ( $\theta > 0$ ) with  $\alpha_i$  and  $u_{i1}$  independent of one another.

Consistent estimates can then be obtained by jointly estimating the approximate reduced form probability of household joblessness for the initial state of the sample (5) and the latent dynamic household joblessness (3), using maximum likelihood. In the next section, only the results for (3) are presented since (5) is just an auxiliary equation. The only parameter of interest arising from (5) is  $\theta$ , since its significance indicates whether there is endogeneity of the initial conditions.

## 6.2 The Results

The model is estimated on the same sample of individuals which is used in Section 5.1 for the multivariate analysis of the incidence of household joblessness. The sample contains all individuals between 18 and 64 years of age. However, because the model uses the panel

component of the HILDA data, only individuals for whom at least two consecutive waves are available are included.

The estimated coefficients and marginal effects are reported in Tables 6.1 and 6.2 using the same two alternative definitions of household joblessness as in Section 5, for females and males respectively. The main advantage of including marginal effects is that they allow comparison across models. They allow us to compare the effect of each variable under both joblessness definitions and for males and females. The importance of allowing for the individual random effects is shown by the clear rejection of the null hypothesis that  $\rho = 0$  (the absence of individual heterogeneity) in all specifications of the model. In addition, allowing for the endogeneity of the initial conditions in the random effects model is shown to be important as well, since the estimator of  $\theta$  is significant in all specifications. These results thus validate our choice for the dynamic random effects model which allows for the endogeneity of the initial conditions.

Both tables show that state dependence is highly relevant as indicated by the significant coefficient on the lagged household joblessness variable.<sup>21</sup> That is, even after controlling for a range of individual and household characteristics and unobserved heterogeneity, being in a jobless household in one year significantly increases the probability of being in a jobless household the following year. This result is found for males and females, independent of the definition of household joblessness used. The marginal effects reveal that the effects are larger under the first definition than under the second, for both males and females. Being in a jobless household in the previous year increases the probability of household joblessness in the current year by 22.3 percentage points for males under the first definition, but only by 12.9 percentage points under the second definition. The respective figures for females are 24.0 and 16.7 percentage points. Perhaps this is due to larger measurement errors of household joblessness under the second definition, leading to more variability and thus a weaker relationship of household joblessness status between periods of time. The marginal effects also indicate that state dependence is somewhat larger for females than for males.

The use of the alternative joblessness definition only affects the level of significance of a few coefficients but not the direction of the effects (that is, the sign of the coefficients).<sup>22</sup> In addition, the results are to a large extent consistent with those from the descriptive multivariate analyses presented in Section 5. The results also show that all coefficients have

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<sup>21</sup> Note that the lagged joblessness variable does not need to relate to the same household as in the current period. It is the joblessness of the household of which the individual was a member at that time.

<sup>22</sup> The only exception is the partner dummy for males: it is negative when using the first definition of joblessness but positive with the alternative definition. However, only the negative coefficient is significant (at the ten per cent level).

the same sign for males and females,<sup>23</sup> even though the size of the marginal effects and/or the level of significance can vary by gender.

**Table 6.1 Dynamic model of household joblessness, females**

	Definition based on past year's calendar questions			Definition based on household questionnaire		
	Coef.	z-value	Marg. Eff.	Coef.	z-value	Marg. Eff.
Lagged household joblessness	1.577	24.26	0.240	1.250	21.61	0.167
Age/10	-0.532	-2.78	0.005	-0.799	-4.35	0.008
Age squared/100	0.064	2.87		0.101	4.66	
<i>Education level (reference is &lt;Year 10)</i>						
Year 10, 11 or Cert. I/II	-0.143	-1.69	-0.016	-0.138	-1.68	-0.015
Year 12	-0.296	-2.87	-0.031	-0.280	-2.85	-0.029
Cert. III/IV	-0.402	-3.98	-0.041	-0.307	-3.32	-0.031
Diploma	-0.331	-2.92	-0.034	-0.353	-3.17	-0.036
University	-0.624	-5.82	-0.059	-0.700	-6.79	-0.064
SEIFA index decile	-0.065	-6.42	-0.006	-0.069	-7.23	-0.006
Not in major city	0.130	2.37	0.012	0.149	2.82	0.014
Disability	0.445	7.96	0.046	0.433	8.25	0.044
Mental health index	-0.008	-5.91	-0.000	-0.007	-5.60	-0.000
Missing mental health index	-0.587	-4.82	-0.048	-0.547	-4.90	-0.045
<i>Household type (reference is couple)</i>						
Lone parent	0.813	4.57	0.085	0.892	5.39	0.092
Related family and group households	0.346	1.51	0.031	0.507	2.29	0.046
Lone person	0.583	3.29	0.056	0.693	4.17	0.067
Multi-family household	0.675	3.77	0.067	0.891	5.72	0.092
No. of resident children	-0.095	-3.24	-0.009	-0.102	-3.76	-0.009
No. of resident children under 5	0.431	8.01	0.045	0.493	9.89	0.052
Partnered	-0.619	-3.20	-0.060	-0.461	-2.59	-0.043
Retired	0.449	5.70	0.048	0.584	8.25	0.064
Full-time student	0.842	6.14	0.096	1.660	11.26	0.234
Constant	-0.297	-0.70		0.003	0.01	
Rho ( $\rho$ )	0.384	9.68		0.431	13.64	
Theta ( $\theta$ )	1.209	7.70		1.233	9.34	
Number of observations	30,048			32,784		

Note: A z-value above 2.58 indicates significance below the 1% level, a value above 1.96 indicates significance below the 5% level, and a value above 1.64 indicates significance below the 10% level. Average values at the individual level across all waves are included for the variables Partner, Retired and Student, which means the coefficients on these variables represent the effect of a deviation from these individual averages. The initial conditions equation includes all variables in the main equation except the lagged joblessness indicator. In addition, work experience in years, squared work experience, the proportion of time spent in unemployment since completing full-time education, the proportion of time not in work since completing full-time education and whether or not individual  $i$  is from a non-English speaking background are included.

<sup>23</sup> Again, the only exception is the partner dummy for males under the second joblessness definition.

**Table 6.2 Dynamic model of household joblessness, males**

	Definition based on past year's calendar questions			Definition based on household questionnaire		
	Coef.	z-value	Marg. Eff.	Coef.	z-value	Marg. Eff.
Lagged household joblessness	1.601	21.11	0.223	1.211	17.07	0.129
<i>Age (reference is 18-29)</i>						
30-39	0.233	2.53	0.016	0.416	4.26	0.026
40-49	0.264	2.73	0.018	0.404	3.94	0.025
50-59	0.288	2.81	0.020	0.518	4.78	0.033
60-64	0.711	5.86	0.058	1.010	7.99	0.078
<i>Education level (reference is &lt;Year 10)</i>						
Year 10, 11 or Cert. I/II	-0.294	-3.06	-0.025	-0.329	-3.26	-0.026
Year 12	-0.391	-3.43	-0.032	-0.486	-3.98	-0.036
Cert. III/IV	-0.398	-4.24	-0.032	-0.423	-4.29	-0.032
Diploma	-0.381	-3.19	-0.031	-0.432	-3.44	-0.033
University	-0.505	-4.63	-0.039	-0.482	-4.28	-0.036
SEIFA index decile	-0.060	-5.62	-0.004	-0.082	-7.28	-0.005
Not in major city	0.110	1.95	0.008	0.016	0.28	0.001
Disability	0.674	11.30	0.060	0.620	10.26	0.050
Mental health index	-0.007	-4.82	-0.000	-0.009	-6.12	-0.001
Missing mental health index	-0.449	-3.57	-0.028	-0.573	-4.54	-0.033
<i>Household type (reference is couple)</i>						
Lone parent	0.211	1.31	0.015	0.348	2.07	0.023
Related family and group households	0.357	2.02	0.026	0.476	2.50	0.033
Lone person	0.346	2.47	0.026	0.606	4.07	0.044
Multi-family household	0.517	2.36	0.041	0.773	3.88	0.060
No. of resident children	-0.157	-4.56	-0.010	-0.212	-5.99	-0.013
No. of resident children under 5	0.341	5.56	0.027	0.417	6.60	0.032
Partnered	-0.322	-1.82	-0.023	0.043	0.24	0.003
Retired	0.591	6.16	0.054	0.877	9.54	0.083
Full-time student	0.575	3.74	0.049	1.544	8.45	0.182
Constant	-1.424	-7.30		-1.440	-7.09	
Rho ( $\rho$ )	0.271	5.79		0.389	11.06	
Theta ( $\theta$ )	1.270	5.12		1.125	6.65	
Number of observations	28,188			29,637		

Note: A z-value above 2.58 indicates significance below the 1% level, a value above 1.96 indicates significance below the 5% level, and a value above 1.64 indicates significance below the 10% level. Average values at the individual level across all waves are included for the variables Partner, Retired and Student, which means the coefficients on these variables represent the effect of a deviation from these individual averages. The initial conditions equation includes all variables in the main equation except the lagged joblessness indicator. In addition, work experience in years, squared work experience, the proportion of time spent in unemployment since completing full-time education, the proportion of time not in work since completing full-time education and whether or not individual  $i$  is from a non-English speaking background are included.

For females, the effect of age has a U-shape, meaning that both younger and older adults face an increased probability of household joblessness. The lowest probability of being in a jobless household is estimated at about 40 years of age in both specifications. The marginal effects combining the effects of both the linear and the quadratic terms indicate that being one year older increases, on average, the probability of household joblessness by 0.5 and 0.8 percentage points under the first and second definition respectively.

Age dummies rather than the combination of a linear and a quadratic term have been chosen to capture the age effect for men because this specification has proven to be more appropriate for this demographic group. *Ceteris paribus*, men over 30 years of age face a higher risk of household joblessness than males between 18 and 29 years old (the reference group). For those between 30 and 59 years of age, the probability of household joblessness is increased by between 1.6 and 3.3 percentage points depending on their specific age group and the joblessness definition. The effects are much larger for males aged between 60 and 64 years; the increase in household joblessness probability is 5.8 percentage points under the first definition and 7.8 percentage points under the second definition.

As was the case in the regressions in Section 5, education significantly reduces the probability of household joblessness. For males, any education level above Year 9 significantly reduces the probability of household joblessness (compared to the reference group which is Year 9 or less). However, the largest effects are associated with a university degree (-3.9 and -3.6 percentage points under the first and second definitions), whereas the smallest effects are for completion of Year 10 or 11 or a Certificate I or II (-2.5 and -2.6 percentage points respectively). The effects are similar for females but there is a larger gap between the effects of a university degree and those of other education levels. As mentioned in Section 5.1, a potential explanation for this is that men are likely to participate in the labour market independent of whether they have finished a higher education or not whereas female participation depends more on their investment in human capital.

The SEIFA index decile also has a negative effect on the probability of household joblessness, indicating that those living in more advantaged areas are less likely to live in a jobless household, although the marginal effects are small. Living outside of the major cities is a factor associated with a higher incidence of household joblessness for females but the effect is only significant under the first definition for males.

Disability as well as low mental health indices are two factors increasing the probability of household joblessness.<sup>24</sup> Although the marginal effects associated with mental health are relatively small (0.1 or less than 0.05 percentage point increase in the probability of

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<sup>24</sup> Note that missing mental health index has a negative effect on the probability of household joblessness. This variable is missing for those who did not complete the Self Completion Questionnaire (SCQ) from HILDA. This suggests that non-completion of the SCQ is correlated with employment, possibly because less time is (made) available for filling out surveys by those who are working.

household joblessness per additional unit of mental health on a scale between 0 and 100), the effects of disability are substantial, particularly for males. Disability increases their probability of household joblessness by 6.0 and 5.0 percentage points under the first and second definition respectively. The corresponding marginal effects for females are 4.6 and 4.4 percentage points.

Household type also affects the probability of household joblessness. Compared to living in a couple household (the reference group), living in any other household type increases the probability of household joblessness for both males and females. For females, being a lone parent has the strongest effect, increasing household joblessness by 8.5 and 9.2 percentage points under the first and second definition respectively, followed by belonging to a multi-family household (6.7 and 9.2 percentage points) and then being a lone person (5.6 and 6.7 percentage points), while the smallest effect is found for group or related family households (3.1 and 4.6 percentage points). For men, the lowest effect is for lone parent households and the largest effect for multi-family households under both definitions. It is clear that the effects of household type are smaller for males than for females.

Again consistent with the previous two sections is the negative effect of the number of children combined with the (stronger) positive effect of the number of children under five years old. These effects are again larger for females than for males. For the former, an additional child under five years old increases the probability of household joblessness by 3.6 and 4.3 percentage points under the first and second definition respectively.<sup>25</sup> By comparison, the corresponding effects for males are 1.7 and 1.9 percentage points.

The coefficients on the last three variables (that is, having a partner, being retired and being a full-time student) measure the effect of individual changes observed in the data rather than cross-sectional differences, since we have also included average values over time for each individual on these variables to account for differences between individuals separately.<sup>26</sup> Having a partner is associated with lower probabilities of household joblessness for females, by 6.0 percentage points under the first definition and 4.3 percentage points under the second definition. For males, the effect is smaller and significant at the ten per cent level only under the first definition. As expected, being a full-time student or being retired increases the probability of household joblessness significantly for both males and females. Under the first definition, being a full-time student increases the probability of household joblessness by 9.6 and 4.9 percentage points for females and males respectively. It is, however, difficult to explain why these effects jump to 23.4 and 18.2 percentage points under the second definition. One possible explanation is the different definition of the student variable in the

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<sup>25</sup> To obtain these marginal effects, the marginal effects associated with an additional child have to be combined with those associated with an additional child under five years old.

<sup>26</sup> The coefficients on these average variables are also significant and in the same direction, except for the average value of having a partner.

two specifications. Under the second definition only full-time students who are not working at all are included as full-time students in the dummy variable. The marginal effects for being retired are 4.8 and 5.4 percentage points under the first definition for females and males respectively, and 6.4 and 8.3 percentage points under the second definition.

## 7. Conclusion

This report presents the results from an investigation into the dynamics of household joblessness in Australia using the Household Income and Labour Dynamics in Australia (HILDA) Survey, Waves 1 to 7. The focus of most analyses in this report is on the individual and his or her probability of being a member of a jobless household.

This report uses a combination of descriptive univariate and multivariate analyses to examine the extent and persistence of household joblessness. In addition, panel data methodology is used to investigate what factors in addition to being in a jobless household in the previous period affect the current state of household joblessness of an individual. Although the issue of interest is household joblessness, all analyses are done at the individual level so that changes in household composition, as might occur through partnering or divorce, can be taken into account.

The multivariate dynamic random effects probit analysis is most helpful in shedding a light on the factors associated with household joblessness, whilst controlling for observed and unobserved heterogeneity and allowing for state dependence (or persistence).<sup>27</sup> However, one result from the descriptive analyses is worth mentioning before discussing the dynamic model's results. Although it is found that single persons are more at risk of household joblessness than other groups, this jobless group of singles consists mostly of retired persons (over the Age Pension age). Once this group is excluded from the analysis, we find that lone parents (mostly mothers) are most at risk of household joblessness. Despite this high risk of household joblessness for older individuals, similar to what is found for any of the other groups, older individuals have become less likely to be a member of a jobless household between 2001 and 2007.

The results from the dynamic random effects probit model are relatively straightforward to interpret. State dependence is found to be important for men and women for both definitions of joblessness. *Ceteris paribus*, being in a jobless household in the previous year increases the probability of household joblessness in current year by 24.0 and 22.3 percentage points for females and males respectively, under the first joblessness definition, and by 16.7 and 12.9 percentage points under the second definition. In addition, unobserved differences between individuals and a range of observed factors are found to affect the probability of household joblessness.

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<sup>27</sup> However, there is a large degree of consistency with what is found in the more descriptive analyses.

Health and level of educational attainment are both found to be important factors, with bad health and low levels of educational attainment both contributing to the probability of an individual being in a jobless household. Any education level above Year 9 reduces the probability of household joblessness, with the largest effects being associated with a university degree.

The youngest and oldest females are more at risk of being in a jobless household than the group in the middle. For men, the risk of household joblessness is lowest for those aged between 18 and 29 years. It increases for older groups, and is high in particular for those over 60 years of age.

Women living outside of a major city are more at risk, as are both men and women living in low SEIFA areas. To some extent, these factors could be caused by the joblessness rather than the other way around.

Different household types are associated with different risks of household joblessness. For women, being a single parent is associated with the highest probability of living in a jobless household, whereas this effect is insignificant for men. The next highest risk is experienced by multi-family households and lone person households for women. For men, these two groups are at the highest risk of household joblessness. The results also indicate that the effects of household type are clearly larger for females than for males.

Households with young children are more at risk of joblessness than other households but households with older children are less at risk of joblessness. Again, the results indicate that these effects are larger for females than for males. For the former, an additional child under five years old increases the probability of household joblessness by 3.6 and 4.3 percentage points under the first and second definition respectively. By comparison, the corresponding effects for males are 1.7 and 1.9 percentage points.

Women with a partner are less at risk of being in a jobless household, by 6.0 percentage points under the first definition and 4.3 percentage points under the second definition, whereas for men, having a partner has no effect.

Retired individuals and individuals who are full-time students have a higher probability of being in a jobless household. Being retired was found to have a larger impact on the probability of household joblessness for males than for females.

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## Appendix

**Appendix Table A.1 Household joblessness for individuals reaching Age Pension age during HILDA (65 for men, 62 for females), weighted row percentages**

Proportion of time in a jobless household in the years before reaching Age Pension age Definition based on past year's calendar questions (based on 147 observations)							
	0%	1%-20%	21%-40%	41%-60%	61%-80%	81%-99%	100%
Men	45.4	5.2	2.8	5.2	1.4	7.6	32.4
Women	58.2	5.9	4.3	4.8	3.8	1.2	21.9
Proportion of time in a jobless household in the years before reaching Age Pension age Definition based on household questionnaire (based on 161 observations)							
	0%	1%-20%	21%-40%	41%-60%	61%-80%	81%-99%	100%
Men	42.4	6.3	3.9	7.0	3.4	11.2	25.8
Women	54.5	7.7	7.3	5.6	4.1	3.4	17.4
Proportion of time individual is in retirement in the years before reaching Age Pension age (based on 161 observations)							
	0%	1%-20%	21%-40%	41%-60%	61%-80%	81%-99%	100%
Men	41.8	0.0	6.5	15.2	10.8	16.2	9.6
Women	43.4	0.0	4.3	3.9	23.5	19.4	5.5