Final Report

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Low Pay Dynamics: Do Low-Paid Jobs Lead to Increased Earnings and Lower Welfare Dependency Over Time

Hielke Buddelmeyer, Wang-Sheng Lee, Mark Wooden and Ha Vu

Melbourne Institute of Applied Economic and Social Research

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Executive Summary

- This project examines the issues of low-pay dynamics and earnings mobility and their relation to income support using data from the first four waves (or years) of the Household, Income and Labour Dynamics in Australia (HILDA) Survey (2001-2004).

- The definition of what constitutes a "low-paid" job is a critical part of this analysis. There is, however, no consensus in the literature regarding how this should be best defined. This report thus presents statistics using four different definitions. These are as follows:

  i. Any job where the hourly earnings are less than two-thirds of median hourly earnings.

  ii. As in (i), but with the earnings of casual employees discounted by 20 per cent (to compensate for their lack of entitlement to paid sick leave, paid annual leave, paid public holidays, and annual leave loading).

  iii. Any job where hourly earnings are less than three-quarters of median hourly earnings.

  iv. As in (iii), but where the earnings of casual employees are again discounted by 20 per cent.

- How permanent a state is low pay? Based on descriptive analyses using transition matrices, it appears that a substantial proportion of low-paid workers in 2001 make a relatively quick transition to higher pay.

  - Based on the two-thirds median threshold, 54.7 per cent of persons move out of the low-pay state in the 12 months to 2002. Over the longer period of 36 months to 2004, 53.5 per cent make the transition out of the low-pay state.

- Based on the two-thirds median threshold and a discount for casual loadings, similar results are found. 49.0 per cent of low-paid workers in 2001 had made the transition to higher pay by 2002 and 53.8 per cent had made the transition by 2004.

The following results refer to analysis which does not account for the casual loading.

- A substantial proportion of workers also moved further away from low pay over time - from less than two-thirds of median earnings in 2001 to three-quarter median earnings or beyond. In the 12 months to 2002, 40.4 per cent of low-paid workers made such a transition, while by 2004, 45.7 per cent had made the transition.

- Men were more likely than women to make the transition from low pay to higher pay. Between 2001 and 2004, 61.4 per cent of men had made the transition as compared with 45.5 per cent of women.

- However, some low-paid workers experience a considerable amount of state persistence, with 23 per cent still in the low-pay state by 2004 when using the two-thirds median threshold.

- Results from multivariate dynamic panel probit models that control for person-level characteristics imply that being in a low-paid job (using the two-thirds median threshold) in the previous year significantly increases the probability (by approximately 3 percentage points) that an individual will be in a low-paid job in the current year.

- Is low-paid employment a bridge to higher-paid jobs? Descriptive analyses based on trajectory diagrams suggest that the results are mixed.

  - More than half of low-paid individuals in 2001 managed to break out of their low-pay state (using the two-thirds median threshold) by 2002 but a fifth of these individuals moved back to low pay by 2004.

  - Of those that manage to transition out of the low-pay state, there appears to be some persistency in staying in higher pay states. Three-

quarters of those that moved from low pay (using the two-thirds median threshold) in 2001 to high pay in 2002 were in higher paid jobs in 2003, and around two-thirds were in higher paid jobs in 2004. Around 57 per cent of those that moved from low pay in 2001 to high pay in 2002 were in higher paid jobs in both 2003 and 2004.

- When classifying all trajectories into broad groups then individuals that are observed to be in low paid employment in 2001 can be categorised as follows based on their trajectories: About 48 per cent 'permanently' escape low paid employment. About 11 per cent are persistently low paid and a further 10 per cent only temporarily escape low paid employment. About 20 per cent are churners of various types and about 11 per cent 'permanently' exit employment.

- Does low-paid employment increase the likelihood of experiencing unemployment in the future? This does not appear to be the case. Denoting the current year by *t*, individuals in low-paid jobs in both $t-1$ and $t-2$ are not more likely than individuals in high-paid jobs in both $t-1$ and $t-2$ to be unemployed at time *t*. Instead, the best predictor of whether someone is unemployed at time *t* appears to be if they were unemployed at either $t-1$ or $t-2$. In other words, in terms of future employment prospects a low-paid job is unambiguously superior to a spell of unemployment.

- Do spells of low-paid employment reduce future income support dependency? Yes, a spell of low-paid employment in period $t-1$, relative to not being in the labour force or experiencing a spell of unemployment, reduces the probability to receive more than 90 per cent of total income from income support in period *t* by approximately 7 percentage points. At the same time, it increases the probability of not being dependent on income support in period *t* by about 4.5 percentage points.

1. Introduction

The key objective of this report is to examine whether low-paid jobs lead to higher earning jobs and lower welfare dependency over time.

It is widely recognized that earnings inequality has been increasing in recent decades (Borland 1999, Keating 2003, Saunders 2005), which in turn implies an increase in the number of people receiving 'low pay', at least when expressed in relative terms.[1] Such trends give rise to equity concerns, and are often used to defend arguments for increases in the minimum wage and are generally thought to have influenced recent minimum wage decisions by the Australian Industrial Relations Commission (and more recently, the Australian Fair Pay Commission).

There are, however, at least three reasons why relying on minimum wages to alleviate the incomes of the low paid may be misplaced. First, and perhaps most obviously, raising wages at the bottom of the earnings distribution has the potential to prevent jobseekers (especially those with relatively few job skills) from obtaining employment, which will almost certainly exacerbate inequality. In this case it is income rather than earnings inequality which is adversely affected.

Second, low pay does not necessarily translate into low income. In fact the link between low pay and income poverty has been shown to be highly tenuous. Harding and Richardson (1999), for example, analysed data from the 1994-95 and 1995-96 ABS income surveys and found that less than 6 per cent of low wage earners (defined as less than $10 an hour for adults in 1995-96) lived in households with incomes which fell below the poverty line. Indeed, three-fifths of all low-wage earners were found living in families in the top half of the income distribution.

Third, low pay will often not be a permanent state. That is, the labour market situations of many people will change over time – people move in and out of employment and change jobs, and within the same job what they do and what they are paid changes over time. Knowing that a proportion of individuals are low paid at a

[1] Interestingly, Keating's (2003) research indicates that very little of this growth is driven by changes in relative rates of pay; the main culprit is instead change in the composition of employment.

particular point in time thus reveals very little. To get a more complete picture we need to know how mobile people are. As discussed by Stewart and Swaffield (1999), there are two polar cases. At one extreme, there is no mobility over the working life and persons who are low paid today will remain low paid for their entire working life. This would be a highly inequitable outcome – once low paid, always low paid. At the other extreme, it may be that mobility is such that each individual experiences low pay for a proportion of their working lives and that the share of the working life spent in this state is the same for everyone. In this latter case low pay is not the source of any equity problems. Indeed, if low-paid jobs provide a path between joblessness and employment it may well reduce inequality over the lifetime.

It is this issue of employment dynamics, and more specifically the dynamics of low-paid employment, which is at the centre of this report.

The key research questions to be investigated are highly inter-related but can be summarised as follows:

- How permanent a state is 'low pay'?
- To what extent is low-paid employment a 'bridge' to higher-paid jobs in the future? That is, how permanent or temporary are exits out of 'low pay' into 'high pay'?
- How much churning is there between low-paid employment and joblessness and to what extent does low-paid employment reduce or exacerbate the likelihood of experiencing unemployment in the future?
- How and to what extent is low-paid employment related to income support? How dependent are low-paid workers on income support? To what extent does low-paid employment interrupt dependency on income support?

The first two questions and part of the last question are primarily addressed using descriptive methods. The first and third questions are also more adequately addressed using dynamic panel models, examining the state dependence of low-paid employment and the state dependence of joblessness and the role played by intervening low-paid employment. In addition, the fourth question is discussed using a dynamic panel multinomial logit model, where "dependency on income support" is

defined using a summary income support reliance measure that expresses total income support payments as a proportion of total income.

1.1 Previous Research

The issue of low pay dynamics and earnings mobility has been much studied in overseas countries, especially in the UK. Gregory and Elias (1994), for example, used longitudinal data collected from employers in the UK New Earnings Survey and found considerable mobility out of the bottom of the wage distribution, especially by younger workers. With the emergence of data from the British Household Panel Survey (BHPS), which commenced in 1991, studies on this issue proliferated, all of which were largely concerned with estimating the probability of exiting low-paid employment or conversely the extent of persistence of the low pay state (Gosling et al. 1997; Sloane and Theodossiou 1996, 1998; Stewart and Swaffield 1997). More recent studies, both in the UK and elsewhere in Europe, have improved upon the earlier work by taking into account the endogeneity of the initial employment condition (Stewart and Swaffield 1999; Capellari 2002; Sousa-Poza 2004) and panel attrition (Capellari and Jenkins 2004; Uhlendorff 2005). Still others have examined the inter-dependence between low pay and unemployment (e.g., Stewart 2005; Capellari and Jenkins 2003). Focusing on the related issue of the dynamics of minimum wage workers, some studies demonstrate that a significant proportion of minimum wage workers do make transitions to higher paid work. For example, a United Kingdom study (Jones et al. 2005) of transitions between labour market states, concluded that "While these transitions rates suggest a measure of persistence at wages at or below the NMW for some workers, for the majority minimum wage employment seems to be only a temporary phenomenon" Similarly, Even and Macpherson (2003) conclude that, for a large majority of workers, minimum wage jobs tend to be entry-level jobs and are of short duration.

Research in Australia is far less common. A number of studies have provided descriptive information about low-paid workers (e.g., Eardley 1998; Harding and Richardson 1999; Mitchell 1999), but the only research that has been able to investigate the mobility of low-paid workers is that by Dunlop (2000, 2001). Dunlop used longitudinal survey data from the Survey of Employment and Unemployment Patterns (SEUP) collected at three points in time (September) in 1995, 1996 and 1997 to:

(i) identify the types of people most at risk of being low paid;

(ii) estimate probabilities of transitions into and out of low-paid employment;

(iii) identify factors affecting the labour market transitions of the low paid;

A particular feature of the SEUP exploited by Dunlop is that, in addition to a general population sample, it includes a special sample of persons identified in May 1995 as jobseekers, many of whom were in employment by the time of interview.

Dunlop found that for about half of the low-paid group, low-paid employment is a temporary state whereas for the remaining half, low-paid employment is relatively persistent or involves churning in and out of joblessness.

There are, however, many reasons why this type of research needs to be both replicated and extended.

(i) Findings from the 1990s may no longer be relevant to the current situation.

(ii) The sample of workers used in her analyses was relatively small in number – less than 1700 – thus giving rise to concerns about the robustness and precision of her estimates.

(iii) The more recent HILDA Survey data set (see below) improves on the SEUP data in a number of ways. Most obviously, at the time of writing, data were available from four waves of the HILDA Survey compared with the three points in time available in SEUP.[2] The household structure of the HILDA sample also enables differences in household circumstances to be better taken account of. Further, the HILDA Survey contains a relatively rich variety of variables, enabling many more variants of the main hypotheses to be tested.

(iv) Econometric techniques for estimating transition probabilities have been much enhanced in the short time since the Dunlop work was undertaken.

(v) Good practice demands that research findings be replicable.

[2] The SEUP is described as covering four years. Data for the first year – 1994 – was collected retrospectively at the time of the first interview, and is mostly not used by Dunlop.

Following previous research, low pay will be defined in this report in terms of hourly earnings and not weekly or annual earnings. Section 2 describes the HILDA data used for the analyses in this report. Section 3 discusses the issues surrounding the definition of low pay and defines the working definitions used in this report. Section 4 provides some descriptive analyses of low pay transitions. Multivariate analyses of low pay transitions are performed in section 5. Finally, section 6 concludes.

2. Data

2.1 The HILDA Survey

As noted in the Introduction, the data used in this study come from the first four waves of the HILDA Survey, a longitudinal survey with a focus on work, income and family issues that has been following a sample of Australians every year since 2001.

Described in more detail in Goode and Watson (2006), the HILDA Survey began with a large national probability sample of Australian households occupying private dwellings. All members of those responding households in wave 1 form the basis of the panel to be pursued in each subsequent wave (though interviews are only conducted with those household members aged 15 years or older), with each wave of interviewing being approximately one year apart.[3] Like other households panel surveys conducted in other countries, the sample is extended each year to include any new household members resulting from changes in the composition of the original households. With the exception of children of original sample members (OSMs) and persons who have a child with an OSM, however, these new sample members only remain in the sample for as long as they live with an OSM.

After adjusting for out-of-scope dwellings and households and multiple households within dwellings, the number of households identified as in-scope in wave 1 was 11,693. Interviews were completed with all eligible members at 6,872 of these households and with at least one eligible member at a further 810 households. Within the 7,682 households at which interviews were conducted, 13,969 persons were successfully interviewed.

Details about the evolution of the responding sample over the first four waves are provided in Table 1. The key statistic in this table is the number of people interviewed in all four waves – 10,565, or 76 per cent of those persons initially interviewed in wave 1. This group represents the 'balanced panel' and is the sub-sample used in most of the analyses reported on in this study.

Note that while the original sample was intended to be representative of all persons in Australia living in private dwellings (with the exception of a small number of people

[3] The interviewing period runs from late August until February the following year. The bulk of interviews, however, are completed in the months of September, October and November.

living in the remotest parts of the country), relatively high levels of non-response in wave 1 together with subsequent sample attrition raises the spectre of response bias. Included in the dataset, however, is a set of population weights designed to correct for both sampling and response bias, and are used in this report whenever population estimates are being reported.

Table 1
Individual Response (N) by Wave, HILDA Survey

Wave first interviewed	*Wave 1*	*Wave 2*	*Wave 3*	*Wave 4*
Wave 1	13969	11993	11190	10565
Wave 2	-	1048	705	594
Wave 3	-	-	833	543
Wave 4	-	-	-	706
TOTAL	13969	13041	12728	12408

Source: Watson and Wooden (2006).

2.2 The Measurement of Earnings

The earnings measure used here is usual current gross (i.e., before tax) weekly pay. It is derived from a sequence of questions that asks respondents to provide the gross amount of their most recent pay, the length of that pay period, and then to indicate whether that is their usual pay. If it is not their usual pay, details of their usual pay are then collected. The relevant questions are based quite closely on a similar set of questions included in the Australian Bureau of Statistics (ABS) Survey of Income and Housing Costs.

Like all households surveys, the HILDA Survey data will be affected by a range of problems, including sampling error, measurement error and item non-response. In principle, any sampling biases should be corrected for by the use of appropriately constructed population weights. Response errors are potentially more problematic. Most obviously, while the question specifically suggests the respondent refer to their last pay slip, relatively few respondents have this available at the interview and hence many respondents provide rough approximations while others are simply unable to provide any answer. In the latter event, interviewers are advised to probe for an

annual amount. As a result, the incidence of item non-response tends to be relatively low. Indeed, over the four waves the proportion of cases where no information on current earnings is provided averages just 4.5 per cent (see Goode and Watson 2006, Table 27, p. 76). The HILDA Survey dataset, however, provides a fully imputed earnings variable which replaces all missing cases with an imputed value derived using well accepted statistical techniques (again, see Goode and Watson 2006 for a detailed explanation). As a result, no cases are lost to this analysis when using earnings in all jobs.

A crude guide to the quality of the earnings data in the HILDA Survey is provided by comparing the population weighted estimates from HILDA with estimates from other national surveys. Table 2 thus compares the HILDA Survey estimates of average weekly earnings with those from the August supplement to the ABS Labour Force Survey (LFS) and the August ABS Average Weekly Earnings (AWE) Survey. Like the HILDA Survey, the LFS involves a sample of households. The sample, however, is very large (there were just over 33,000 households in-scope for the August 2004 survey) and is associated with very low rates of non-response. The AWE Survey, on the other hand, derives its earnings estimates from a sample of employers. Given the primary source of data for the AWE Survey is employer payrolls, it should be subject to relatively little measurement error. Of course, it only provides information about jobs and not employees.

Note that we have done our best to ensure that the estimates from the different sources are comparable. Thus when comparing HILDA Survey estimates with LFS estimates we use earnings in all jobs (and not just the main job). Nevertheless, there are differences. Most obviously, both of the ABS sources used here refer to a specific pay period whereas the HILDA estimates refer to usual pay. This will affect the distribution of earnings but it is not obvious that it should have any impact on the mean value. There are also small differences in the population coverage. The AWE Survey, for example, excludes employees of private households and workers on workers' compensation. No such exclusions can be made in the HILDA data. There are also some differences in definitions; most notably in how a full-time employee is defined. In the HILDA Survey a full-time worker is any person who usually works 35 hours or more per week, whereas in the LFS the full-time group also includes persons who usually work less than 35 hours per week but actually worked more than this in the survey reference week. Very differently, definitions of full-time and part-time

employment in the AWE Survey depend on the definitions of agreed hours in awards and industrial agreements (but in the absence of any agreed hours, then the definition is the same as used in the HILDA Survey). Finally, both of the ABS sources concern a pay period in August, whereas the HILDA Survey estimates should apply to the time of interview, which could be any time between August and the following February.

Table 2
Average Weekly Earnings: HILDA Survey and ABS Estimates Compared

Year	*Full-time employees*			*All employees*		
	HILDA ($)	*LFS (Aug) ($)*	*% difference*	*HILDA ($)*	*LFS (Aug) ($)*	*% difference*
2001	859.70	835.00	+2.9	693.00	687.00	+1.0
2002	875.30	863.00	+1.4	697.10	707.00	-1.4
2003	909.10	904.00	+0.6	726.10	734.00	-1.1
2004	957.30	932.00	+2.7	767.20	766.00	0.0

Notes: HILDA Survey estimates are the mean weekly earnings in *all jobs* for all employees, including owner managers, but excluding members of the Australian defence forces.

	Full-time adult employees			*All employees*		
	HILDA ($)	*AWE (Aug) ($)*	*% difference*	*HILDA ($)*	*AWE (Aug) ($)*	*% difference*
2001	893.60	872.70	+2.4	696.20	672.60	+3.5
2002	911.30	918.10	-0.7	701.10	697.10	+0.6
2003	949.75	972.80	-2.4	733.00	732.80	0.0
2004	999.65	1009.70	-1.0	772.00	759.70	+1.6

Notes: HILDA Survey estimates are the mean weekly earnings in the *main job* of all employees, including owner managers but excluding members of the Australian defence forces and persons employed in the agriculture, forestry and fishing industries. Note that for multiple job holders, earnings in the main job is not imputed, which results in the loss of a small number of cases (15).

Sources: LFS: ABS, *Employee Earnings, Benefits and Trade Union Membership, Australia* (cat. no. 6310.0).
AWE: ABS, *Average Weekly Earnings, Australia* (cat. no. 6302.0).
HILDA Survey, release 4.1.

Overall, Table 2 shows that the weighted population means of weekly earnings in the HILDA Survey are not greatly different from either of the two ABS sources used here. Indeed, when compared with the LFS estimate for all employees, the HILDA Survey estimate is very similar. For full-time employees, the HILDA Survey estimate has been consistently above the LFS, but never by more than 3 per cent. This,

however, is entirely expected and reflects the different definitions of full-time that are employed. The differences with the August AWE Survey are also quite small, though more puzzling. Most obviously, we would expect the HILDA estimates to be higher than those reported in the AWE, given the HILDA data are restricted to main jobs whereas the AWE data apply to all jobs. Nevertheless, among full-time adult employees the HILDA Survey estimates are below those from the AWE Survey in all years except 2001.

Table 3
The Distribution of Weekly Earnings in the Main Job, Employees (%): HILDA Survey and LFS Estimates Compared

Weekly earnings in main job	*LFS, August 2004*	*HILDA Survey, Wave 4 (2004)*
Zero	2.0	2.5
$1-$99	4.6	4.9
$100-$199	5.4	5.7
$200-$299	5.5	5.8
$300-$399	6.4	7.1
$400-$499	7.9	7.2
$500-$599	10.4	10.0
$600-$699	11.2	10.8
$700-$799	9.0	8.8
$800-$899	7.3	7.1
$900-$999	6.0	5.6
$1000-$1199	9.8	9.7
$1200-$1399	5.4	5.5
$1400-$1599	3.0	3.0
$1600-$1799	1.7	1.8
$1800-$1999	1.2	1.3
$2000 and over	3.1	3.1

Source: LFS: ABS, *Employee Earnings, Benefits and Trade Union Membership, Australia, August 2004* (cat. no. 6310.0).
HILDA Survey, release 4.1.

While it is gratifying that the estimated mean earnings are similar to those from other sources, the distribution of the data could still be very different. In Table 3, therefore, we report figures on the distribution of weekly earnings in the main job for employees from the August 2004 LFS together with comparable numbers from the 2004 wave of the HILDA Survey. Again, and despite the differences in definitions, the weighted HILDA Survey estimates are very close to those reported by the ABS.

Overall, it seems to safe conclude that the earnings estimate from the HILDA Survey are at least as reliable as the estimates produced in other large national household surveys.

2.3 The Measurement of Working Hours

The other key variable for this analysis is hours of work. Specifically, the measure used in this study is the number of total hours usually worked per week in the main job, where total hours includes any paid or unpaid overtime as well as any work undertaken outside the workplace.

Unlike earnings, there is very little non-response to this question. Measurement error, however, is very likely. It is, for example, often claimed that survey-based data will tend to overstate hours of work at the upper end of the distribution (see Robinson and Bostrom 1994). In large part this will simply be the result of over-reporting, a phenomenon which is especially likely in societies where long hours of work is seen as 'badge of courage'. It could also arise as a result of other measurement problems, including the inclusion of time that we would not generally consider to be work (e.g., meal breaks, time on-call, and commuting time)[4], and in the way some respondents interpret what is meant by 'usual'. What, for example, are the usual weekly hours of someone who works extended shifts (e.g., seven 12-hour shifts followed by seven days off)?[5]

There is, however, no 'gold standard' measure of working hours to benchmark the HILDA Survey data against.[6] Data from employer surveys, such as the ABS Employee Earnings and Hours Survey, for example, are of no practical use since they only report agreed hours, as set down in awards and agreements, together with any paid overtime hours. They do not include the hours worked beyond agreed hours which are not directly remunerated. We thus would expect (and find) that average self-reported working hours are well in excess of the hours data provided by

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4 All interviewers are instructed to advise respondents, if asked, what should and should not be counted as working time. However, it is almost certain that some respondents will include non-working time without querying the interviewer.

5 The questionnaire does include a sequence for respondents whose hours vary from week to week. In this sequence respondents are expected to provide the average number of hours worked per week over a usual 4-week period. Respondents, however, are not first asked whether their hours vary from week to week. As a result, the only respondents who go through this sequence are those that volunteer that their weekly hours are variable.

6 Data from time-use diaries are often argued to provide an appropriate benchmark. Unfortunately, the last national time use survey was conducted in Australia in 1997. Another is being conducted in 2006, but it will be well into 2007 before any data from this survey are publicly available.

employers. The best that we can do, therefore, is to compare the HILDA Survey data with other self-reported data collected from other ABS household surveys. Such a comparison is reported in Table 4. Specifically, we compare data on the distribution of usual hours worked in the HILDA Survey with similar data from the August months of the Labour Force Survey and from the ABS 2000 Survey of Employment Arrangements and Superannuation (SEAS).

Focusing first on the comparison with the LFS, it can be clearly seen that, unlike the situation with weekly earnings, the distribution of self-reported weekly working hours is very different in the two surveys. The LFS has a noticeably higher proportion of persons recorded as working 35 to 40 hours than in the HILDA Survey data set, and lower proportions of worker at both ends of the distribution.

Table 4
The Distribution of Usual Hours Worked (%):
HILDA Survey and ABS Estimates Compared

Weekly hours worked	*All Employed Persons[a], All Jobs*				*Employees[a,b], Main Job*	
	HILDA, Wave 4 (2004)	*ABS LFS, Aug. 2004*	*HILDA Wave 1 (2001)*	*ABS LFS, Aug. 2001*	*HILDA Wave 1 (2001)*	*ABS 2000 SEAS*
1-15	13.5	11.8	13.5	11.9	13.4	12.4
16-29	13.8	12.0	13.1	12.3	13.4	12.1
30-34	6.1	5.9	5.4	5.1	5.1	4.8
35-39	17.4	20.6	17.6	19.9	20.1	21.6
40	16.5	20.1	15.8	20.5	16.7	16.4
41-49[b]	14.1	11.5	14.4	11.5	22.0	22.0
50-59[b]	11.6	10.3	11.6	10.7	6.8	7.6
60 and over[b]	7.1	7.7	8.5	8.1	2.4	3.1

Notes:
a Excluding any employed persons whose usual weekly hours of work are zero.
a Excluding owner managers of incorporated enterprises. The population is also restricted to persons aged under 70 years of age.
b For the SEAS comparison the relevant categories used here are: 41 to 50 hours; 51 to 60 hours; and 61 hours or more.

Sources: LFS: Data available on time-series spreadsheets from *Labour Force, Australia, Detailed - Electronic Delivery, April 2006* (cat. no. 6291.0.55.001), Table 10.
SEAS: *Employment Arrangements and Superannuation, Australia: April to June 2000* (cat. no. 6361.0).
HILDA Survey, release 4.1.

Taken at face value, and given the LFS is not greatly affected by response bias, such findings might suggest the initial HILDA Survey sample is over-represented with both part-time workers and long hours workers. There is, however, at least one reason why such a conclusion might be misleading, and this has to do with the way the LFS is administered. The LFS is administered on an 'any responsible adult' basis, meaning that the first responsible adult with whom the interviewer makes contact answers on behalf of all in-scope household members. In contrast, the HILDA Survey questionnaires are administered to each individual sample member; proxy interviews are not permitted. The LFS approach thus assumes that every adult in the household has the same knowledge about the labour market activity of each household member. While this may be a reasonable assumption for labour force and employment status it seems a much more dubious assumption for working hours.

Not all ABS household surveys, however, use this methodology. Table 4 thus also includes data on the distribution of working hours from the 2000 Survey of Employment Arrangements and Superannuation (SEAS), which relied almost exclusively on personal interviewing. The scope of that survey, however, was restricted to employees, excluding owner-managers, aged 15 to 69 years, and hence we have made a similar restriction to the HILDA Survey data to ensure comparability. The 2000 SEAS, of course, was conducted about 18 months prior to the first wave of the HILDA Survey, but we would not expect this difference in timing to have a large impact. In fact, we find that the two distributions are very close. HILDA continues to have a slightly higher proportion of part-time employees than the ABS survey (possibly reflecting response biases in favour of such workers) but the differences in the distributions are now much closer, consistent with our hypothesis that the observed differences with the LFS may have been mostly due to differences in survey methodology. Alternatively, it is possible that most of the differences in reported hours in the HILDA Survey and the LFS are concentrated on the self-employed. Either way, it seem reasonable to conclude that the hours data for employees from the HILDA Survey are unlikely to be any more biased than hours data from any other survey-based data set.

3. Defining Low Pay

3.1 Background

All investigations into the concept of low pay are confronted by the question of how to define it, and more specifically how to define the low-pay threshold. This is a far from straightforward exercise and should depend, at least in part, on the research question being examined. There is no universally accepted definition.

If the focus is on the relationship between earnings and poverty then it makes sense (at least from a conceptual standpoint) to define low pay in terms of adequacy, and historically it has been this perspective that has dominated thinking about low pay in Australia. Stated another way, there has long been a concern with ensuring that wages are adequate to meet the consumption needs of workers and their families. This preoccupation is usually traced back to the landmark 1907 *Harvester* decision of the then recently established Court of Conciliation and Arbitration in which Justice Henry Bourne Higgins put forward the notion of a "fair and reasonable wage" as that necessary to sustain an average employee in a "condition of frugal comfort estimated by current human standards" (see Creighton and Stewart 2000, p. 41). After gathering evidence from a wide range of sources, Justice Higgins eventually concluded that an appropriate minimum wage for an unskilled man in 1907 was seven shillings per day. A low-paid worker at this time might, therefore, have been defined as any man earning this amount or less.

As discussed by Richardson and Harding (1999, pp. 125-126), ninety years later the same issues were the subject of the so-called Living Wage Case heard by the Australian Industrial Relations and Arbitration Commission. In their 1997 decision, however, the Commission rejected the proposition that it should and could establish a minimum wage based on any defined benchmark of need, and instead established a new federal minimum wage equated with the lowest wage rate then specified in the Metals Industry Award (the C14 classification). Part of the reasoning behind this decision was pragmatic – the diversity of family circumstances made it impossible to establish a single norm of adequacy that would apply equally well to all households. Researchers, however, are not constrained by the need to set a single benchmark and so could in principle derive a large number of adequacy thresholds which would vary with family size and composition. It is this type of approach that lies behind the

budgets standards method implemented in Australia by the Social Policy Research Centre (Saunders et al. 1998). They, for example, derived what was described as a 'low cost budget standard' based on the cost of acquiring goods or services used by at least 75 per cent of Australian households. Saunders et al. (1998, p. 63) describe this standard as representing 'a level of living which may require frugal and careful management of resources', a description which resonates with the language used in the Harvester decision. For households in Sydney in 1997 this standard was found to vary from $193 per week for a single aged person living in public housing to over $730 per week for a couple household with four children who were renting in the private market.[7] By comparison, the federal minimum weekly wage established in May that year was $359.40. Of course, different budget standards would need to be calculated for households living in other regions of Australia (see Henman 1998).

In principle, it does not appear to be much of a leap to determine what weekly rates of pay (before tax) are required to support these expenditure levels. Nevertheless, we know of no study, and certainly no Australian study, that has used the budget standards approach to identify workers who are low paid.[8] One reason why the budget standards approach has not been used might simply be that the many value judgments and assumptions involved in the estimation of budget standards render it unattractive to other researchers. Added complexity also arises from the need to derive different measures depending not only on household type but also on where those households are located. Ultimately, however, it is not the complexity of the budget standards calculations that render this method unsuitable for the present study, but the fact that a needs-based approach is not appropriate for examining questions relating to earnings mobility and labour market transitions. In the needs-based approach transitions out of low pay can occur because of changes in family circumstances and relocation. In contrast, analyses of earnings mobility are not concerned with whether earnings are adequate to support some pre-defined lifestyle; the focus instead is on whether, and by how much, the financial return to working has changed over time.

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7 The SPRC also calculated a 'modest but adequate standard' which they described as affording "full opportunity to participate in contemporary Australian society and the basic options it offers" (Saunders et al. 1998, p. 63). It was based on a 50 per cent ownership rule.

8 The closest to approximating the budget standards approach would be the approach adopted by poverty researchers in the UK in the 1980s who defined low pay as the level of gross earnings required to take household income above the level of out-of-work benefits that would apply (see Webb et al. 1996, p. 257). However, even these researchers did not attempt to construct a multiplicity of poverty lines to reflect variations in family size and circumstances. Rather a single low-pay threshold was derived for a hypothetical household family type (usually a couple with two children).

Previous research into the dynamics of low-paid employment has thus not defined low pay by reference to some standard of need. Instead the most common approach is to define a single low-pay threshold relative either to the distribution of earnings or to some administrative standard (such as a legislated minimum wage). Lillard and Willis (1978), for example, in what may have been the first application of this approach with respect to earnings, defined an individual to be poor if earnings fall below an arbitrary poverty line defined as equal to one half of median male earnings as reported in the corresponding year in the US Current Population Survey. Strictly speaking, however, this analysis was not concerned with low pay per se since earnings were measured over a year and thus influenced by episodes of non-employment. More recent research which has been concerned with the pay for the job (or the wage) rather than earnings has thus typically set the low-pay threshold in terms of hourly rates of pay.

The choice of threshold is highly variable across studies. Some (e.g., Gregory and Elias 1994, Gosling et al. 1997) have simply defined the low paid as those in the bottom decile or quintile in the wage distribution, which fixes the low paid to be a predetermined proportion of the working population. More usual, however, is to set the threshold as a proportion of either median or mean hourly earnings, with the proportion chosen varying anywhere from 50 to 75 per cent. A number of Australian studies have adopted this type of approach. Miller (1989), for example, chose a threshold equal to 75 per cent of median gross hourly earnings, though his analysis was restricted to people aged 25 years or younger, while Eardley (1998) used the two-thirds of median threshold that is more common in the international literature.

Somewhat differently, Richardson and Harding (1999, p. 127) chose a rate of $10 per hour in 1994/95[9], partly on the grounds that this rate was "not much above the lowest adult award wage then available (about $9)". Comparisons with data from an earlier year were then facilitated by choosing an hourly rate for the earlier year that represented a comparable proportion of average weekly ordinary time earnings. In effect, their threshold was set at 60 per cent of the mean weekly ordinary time earnings for full-time males. Dunlop (2000, 2001) also chose a $10 per hour threshold for 1994, but indexed the threshold to the change in average weekly total earnings for all employees.

[9] $6 per hour for persons under 21 years of age.

Since the choice of threshold is entirely arbitrary the resulting estimates of the size of the low-paid sub-population will vary substantially. Dunlop (2000), for example, reported estimates of the incidence of low pay in her sample of employed adult wage and salary earners that varied from 8.6 per cent, using the two-thirds of median hourly earnings threshold, up to 19 per cent, using her $10 per hours threshold (together with her adjustment to rates of pay applicable for casual employees; see below). The main purpose of this present analysis (and that of Dunlop), however, is not to quantify the size of the pool of low-paid workers, but to examine the future market destinations of low-paid workers. This we strongly suspect is relatively insensitive to how low pay is defined. In any case, the simplicity of this single threshold approach makes sensitivity analysis very easy to conduct.

3.2 Definition

In this analysis we define a person as low paid if their rate of pay is below some predetermined threshold. As noted above, in the international literature the most commonly used threshold is two-thirds of the median gross hourly wage. For the purposes of this report, we adopt this widely used benchmark as well as an alternative threshold based on three-quarters of the median gross hourly wage. As is common in most survey-based approaches, the hourly wage is derived by dividing the gross usual weekly wage by usual weekly hours worked.[10] The usual rationale for employing a threshold based on hourly rates of pay is that the alternative – a cut-off based on weekly pay – will see some individuals defined as low paid simply because they work relatively few hours. This is usually judged problematic, especially when those part-time hours are the preferred working arrangement of the individual.[11]

On the other hand, at the other end of the working hours distribution some people will be defined as high-paid because of the large numbers of hours they report usually worked. According to the data set used here, for example, around 23 per cent of all employed persons in Australia report usual weekly hours of at least 50 (Drago et al. 2005).[12] This in itself is not necessarily a problem provided both that hours are

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[10] The HILDA Survey allows respondents to answer the questions on pay with respect to a variety of pay periods. All responses are thus first converted to a common time unit – a week.

[11] It is well established that the majority of part-time workers do not have preferences for more hours. According to Labour Force Survey data for August 2005, only 24 per cent of persons defined as being employed on a part-time basis indicated a preference for longer working hours.

[12] Compared with the Labour Force Survey, the HILDA Survey substantially overstates the incidence of long working hours. Estimates from the Labour Force Survey indicate that the proportion of the employed workforce that usually work 50 hours or more per week during

measured accurately and that one working hour is much like another. Neither assumption, however, is likely to be realistic. First, and as discussed earlier, there are good reasons to believe that respondents will tend to over-report working hours, especially at the upper end of the hours distribution. Second, many of the additional hours worked beyond the weekly norm are likely to be very different to the first 40 hours. For a start, many are worked at home and thus often combined with non-work activities. Further, there is a strong discretionary element to at least some of these extended work weeks; that is, it is not obvious that the additional hours being worked is in all cases a requirement of the job. Such arguments suggest consideration be given to capping working hours, as Richardson and Harding (1999) do. They, however, cap weekly hours at a very low level – 40. Their justification for this was that their interest in low pay arises from a concern about the adequacy of income. This is very different to the focus of this paper and so is less appropriate. We thus experiment with a cap set, somewhat arbitrarily, at 60 hours per week.

We use the earnings of all adult employees as the benchmark. We decided to exclude all persons under the age of 21 years from the analysis given wages structures in many jobs (and in most awards) provide for junior rates of pay which are below those that apply to adult employees. Certainly the inclusion of juniors would cause the low-pay threshold to fall and reduce the number of adults defined as low paid.[13]

As is conventional, the analysis is also restricted to wage and salary earners (i.e., employees) and excludes full-time students. Further, but very different to most previous Australian studies, we also exclude all owner-managers of incorporated businesses. While the ABS treats such persons as employees of their own business, and hence wage and salary information is collected from them, concerns about both the general quality of income information provided by the self-employed and the way incomes are apportioned to earnings by owner-managers argues strongly in favour of their exclusion.[14]

September to November – the period of peak interviewing for the HILDA Survey – has varied from 18.6 per cent in 2001 to 17.7 per cent in 2004.

[13] An alternative approach would be to follow Richardson and Harding (1999) and define a separate low-pay threshold for juniors. This, however, is far from straightforward in an analysis of pay dynamics. For a start we would need to define separate low-pay thresholds for each year of age up to and including 20 years. Relatively small sample sizes, especially after exclusion of the full-time students, however, will almost certainly mean that the estimation of such thresholds using the approach adopted in this analysis will be highly imprecise.

[14] Consistent with the argument that the incomes of the owner-managers are badly measured, inclusion of owner-managers would actually cause the estimated incidence of low paid employees

We also need to decide how to deal with multiple job-holders. Most studies ignore this distinction; the hourly earnings measure is based on earnings in all jobs. Again this seems a reasonable decision if the focus of the research is on the adequacy of incomes, but not where the focus is on earnings mobility. In our preferred measure we thus only use the earnings and hours from the main job, defined in the HILDA Survey as that which provides the most pay each week.

We next need to decide from which data source to draw the benchmark. Most convenient is to use the HILDA sample itself (as compared with some external benchmark). Given the HILDA Survey is designed to provide a representative sample of all Australian residents living in private households this seems a reasonable step. Further, it provides a simple mechanism for automatically updating the low-pay threshold over time – we simply tie the threshold to the observed changes in the distribution of hourly earnings within the HILDA sample.

A final very important issue concerns the treatment of casual employees. Since the rates of pay of casual employees typically include a pay loading, usually assumed to be around 20 per cent, to compensate for their ineligibility for annual leave, paid sick leave and other entitlements, it is often argued that the measured hourly pay rates of casual employees needs to be discounted by 20 per cent. This, for example, was the approach used by Dunlop (2000, 2001).[15] Alternatively, it could be argued that the casual pay loading is conceptually no different than the pay loading (implicit or explicit) that is attached to any job as compensation for some undesirable characteristic. Casuals get a higher rate of pay to compensate for lack of access to leave entitlements in the same way that, say, underground miners attract a pay loading to compensate for dangerous working conditions.

Casual employment, however, is somewhat distinctive in that the immediate hourly pay advantage of casual employees can only be translated into higher earnings over the medium and long term if they work more hours per year than a comparable non-casual employee. In the extreme case this differential would be eight weeks, representing the four weeks paid annual leave, 10 paid public holidays and two weeks paid sick leave that the typical non-casual employee is entitled to. In other words, the

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to rise by about one percentage point, with about one-quarter of these owner-managers classified into the low paid group (based on our preferred definition, as set out below).

15 A similar approach was used by Watson (2005) in his study of how the earnings of casual and non-casual workers compare.

casual employee may have to work up to 18.2 per cent more hours per year than the non-casual, and if they choose not to work these additional hours their annual earnings will be little different (once the absence of annual leave loading is taken into account) from a comparable non-casual employee.

Clearly the issue of the casual loading is not clear cut. *For this reason, throughout this report we present complementary sets of results with and without a casual loading discount.*

3.3 HILDA Samples Used

The median hourly wage for each wave is derived based on the distribution of hourly earnings of all adult employees (aged 21 years or older) with positive earnings and positive working hours, excluding full-time students.

These are weighted by the responding person weights provided in the HILDA Survey data set (release 4.1). The wage quartile thresholds for each sample are similarly constructed using each specific sample's weighted distribution of hourly earnings. Sample sizes used to derive the thresholds in the next section are 5,723 for wave 1, 5,476 for wave 2, 5,467 for wave 3 and 5,350 for wave 4.

3.4 Low-pay Threshold Estimates

The sensitivity of our estimates of the low-pay thresholds to different assumptions are provided in Table 5. Estimates are provided for each wave of the HILDA Survey data and for six combinations of different assumptions. The table uses the threshold based on two-thirds of the median gross hourly wage. Results for the threshold based on three-quarters of the median gross hourly wage are very similar and not shown. Our preferred combination, reported in bold in row 1, is based on the main job, discards any cases where wage data has to be imputed and does not cap hours of work. The main feature of Table 5 is how robust these thresholds are to different assumptions. Basing the threshold on the hourly rate in all jobs, including imputed cases or applying a cap at 60 hours makes little difference to the estimated threshold.

Table 5
Alternative Estimates of the Low-Pay Threshold
(Not Discounting the Casual Loading)

	Assumptions			*Low-Pay thresholds ($/hour)*			
	Main job vs all jobs	*Imputation*	*Hours capped at 60*	*Wave 1 (2001)*	*Wave 2 (2002)*	*Wave 3 (2003)*	*Wave 4 (2004)*
1	**Main job**	**No**	**No**	**11.38**	**11.85**	**12.28**	**12.79**
2	Main job	Yes	No	11.40	11.85	12.28	12.80
3	Main job	No	Yes	11.40	11.88	12.28	12.85
4	All jobs	No	No	11.40	11.85	12.28	12.78
5	All jobs	Yes	No	11.40	11.85	12.28	12.78
6	All jobs	No	Yes	11.43	11.88	12.32	12.83

Note: All thresholds in this table are based on two-thirds median hourly earnings for all employees aged 21 and over excluding full-time students and self-employed persons, using population weighted data from the HILDA Survey, release 4.1.

Proceeding with using a threshold based on the main job, no imputation and not capping hours (i.e., row 1 in Table 5), estimates of the proportion of the adult employees who would be defined as low paid under the two definitions of low pay are presented in Table 6. The threshold based on using two-thirds of the median gross hourly wage defines the size of low-paid worker group to lie in a range between 10 and 11 per cent of the adult employee population. By contrast, the alternative definition (three-quarters of the median gross hourly wage) defines the low-paid worker group to be between 18 and 20 per cent of the adult employee population.

Of some note, the estimates from the two-thirds threshold are highly consistent with the estimate of 10.6 per cent for 1995-96 obtained by Eardley (1998), who used the same two-thirds threshold level used here.[16] This finding thus suggests little change in the incidence of low pay over the last decade.

[16] The estimates of Eardley (1998), however, are not directly comparable with the estimates generated here. There are, for example, likely to be differences in the surveys and sampling methods that generated the data behind these two estimates. Further, the data used by Eardley included owner-managers of incorporated businesses, a group that has been excluded here. Inclusion of this group actually raises the proportion of employees defined as low paid, to between 11 and 12 per cent.

Table 6
Low-Pay Thresholds and the Incidence of Low Pay
(Not Discounting the Casual Loading)

	Wave 1	*Wave 2*	*Wave 3*	*Wave 4*
Low-pay threshold – 2/3 median hourly earnings ($)				
All employees	11.38	11.85	12.28	12.79
Weekly equivalent ($)	432.44	450.33	466.64	486.02
Number of adult employees on low pay	596	524	537	521
Low pay incidence (weighted % of adult employees)	10.5	10.2	10.9	10.3
Low-pay threshold – 3/4 median hourly earnings ($)				
All employees	12.80	13.33	13.82	14.39
Weekly equivalent ($)	486.40	506.54	525.16	546.82
Number of adult employees on low pay	1055	996	954	926
Low pay incidence (weighted % of adult employees)	18.9	19.6	18.7	18.4
Total sample size	5723	5428	5467	5350

Note: Weekly equivalents are based on a 38 hour week.

Source: HILDA Survey, release 4.1.

Table 7 presents estimates of the low-pay threshold and the incidence of low pay when the hourly pay of casual employees is discounted by 20 per cent. Following ABS convention, a casual employee is defined as any employee who reports not receiving any entitlements to both paid annual leave and paid sick leave.[17] Compared to Table 6, a key difference is that there are now two low-pay thresholds – one for non-casuals and one for casuals. Specifically, hourly wage rates for casual employees, as reported in the data, are assumed to include a 20% loading. We obtain adjusted wages that are net of this loading by dividing the observed hourly wage rate for casual employees in the data by 1.2. This generates a new dataset with adjusted hourly wages for casuals (we leave the hourly wages of non-casuals as-is). We then compute the median hourly wage rate based on the distribution in this new dataset of the (adjusted) hourly earnings of all the adult employees, excluding self-employees, managers of incorporated business and full-time students, using the responding person weights constructed in HILDA (release 4.1). The low-pay threshold is set at two-thirds of this

[17] Also in line with the ABS treatment, respondents who do not know whether they receive such entitlements are assumed to not to have them.

median hourly wage rate. We now need to re-introduce the 20% loading to get the corresponding low-pay threshold for casuals. In short, we first adjust wages by taking out the loading, compute the median and then add back the loading for casuals to obtain low-pay thresholds for non-casuals and casuals, respectively.

Reflecting the loading of casual employees, the low-pay thresholds for casuals shown in Table 7 are higher than the low-pay thresholds for non-casuals. For example, based on wave 1 data and using two-thirds of median hourly earnings as the cut-off, a non-casual worker earning $11.05 or less would be classified as a low-paid worker whereas a casual worker earning $13.26 or less would be classified as a low-paid worker.

Table 7
Low-Pay Thresholds and the Incidence of Low Pay
(Discounting the Casual Loading)

	Wave 1	*Wave 2*	*Wave 3*	*Wave 4*
Low-pay threshold – 2/3 median hourly earnings ($)				
Non-casual employees	11.05	11.50	11.90	12.39
Weekly equivalent ($)	420.03	437.00	452.38	470.64
Casual employees	13.26	13.80	14.29	14.86
Weekly equivalent ($)	504.03	524.40	542.86	564.76
Number of adult employees on low pay	719	649	620	575
Low pay incidence (weighted % of adult employees)	12.70	12.73	12.41	11.20
Low-pay threshold – 3/4 median hourly earnings ($)				
Non-casual employees	12.44	12.94	13.39	13.93
Weekly equivalent ($)	472.53	491.63	508.93	529.47
Casual employees	14.92	15.53	16.07	16.72
Weekly equivalent ($)	567.04	589.95	610.71	635.36
Number of adult employees on low pay	1,117	1,068	1,061	1,024
Low pay incidence (weighted % of adult employees)	19.84	20.90	21.03	20.60
Total sample size	5723	5428	5467	5350

Note: Weekly equivalents are based on a 38 hour week.

Source: HILDA Survey, release 4.1.

By construction, this method draws more casual employees into the low-paid group and thus increases its overall size. We now estimate the low-paid group to represent around 11 to 13 per cent of all employees when using a threshold based on two-thirds of median hourly earnings, and between 20 and 21 per cent when using the higher threshold based on three-quarters of the median.

In Table 8, in order to check the validity of using the HILDA data set, we compare our results based on HILDA with the Federal Minimum Wage (FMW), various measures of average weekly earnings and the consumer price index (CPI). For ease of exposition, we only report numbers based on using the definition of low pay that does not discount the casual loading.

Table 8
Low-Pay Thresholds Relative to Minimum and Average Wages
(Not Discounting the Casual Loading)

	Wave 1 (2001)	*Wave 2 (2002)*	*Wave 3 (2003)*	*Wave 4 (2004)*
Federal weekly Minimum Wage ($)	413.40	431.40	448.40	467.40
Average weekly FT adult earnings (jobs) – ABS[a]	872.7	918.1	972.8	1009.7
Consumer Price Index (CPI)[b]	135.4	139.5	142.8	146.5
2/3 threshold as a % of average weekly full-time adult earnings:				
Total earnings (jobs) – ABS[a]	49.6	49.0	48.0	48.1
Ordinary-time earnings (jobs) – ABS[a]	51.0	50.6	49.7	49.8
Total earnings (persons, main job) – HILDA	48.4	49.4	49.1	48.6
3/4 threshold as a % of average weekly full-time adult earnings:				
Total earnings (jobs) – ABS[a]	55.7	55.2	54.0	54.2
Ordinary-time earnings (jobs) – ABS[a]	57.3	56.9	56.0	56.0
Total earnings (persons, main job) – HILDA	54.4	55.6	55.3	54.7

Notes: a From *Average Weekly Earnings, Australia* (cat. no. 6302.0) and apply to the month of November.
b From *Consumer Price Index, Australia* (cat no. 6401.0) and apply to the December quarter.

Source: HILDA Survey, release 4.1.

There are several key points to note. First, the low-pay threshold based on two-thirds of hourly earnings is only just above the FMW (by 3 to 5 per cent). In contrast, the low-pay threshold based on three-quarters of hourly earnings is 16 to 17 per cent above the FMW.

Second, both low-pay thresholds as a proportion of average weekly earnings have been falling slightly over time, reflecting the fact that average earnings have been rising faster than median earnings (i.e., wage inequality has been increasing).

Third, the increases in the low-pay thresholds have been ahead of the rate of increase in consumer prices over this period. For example, the increase in CPI between waves 1 and 2 was 3 per cent whereas the increases in the two low-pay thresholds were both approximately 4 per cent.

Fourth, the low-pay thresholds represent similar proportions of average earnings when using within sample benchmarks (i.e., data from the HILDA Survey) or when using external benchmark data (i.e., data from the ABS Survey of Average Weekly Earnings [AWE]).[18] It is reassuring that the differences between the HILDA Survey and ABS data sources are not large.

These observations, of course, are affected by how the earnings of casual employees are treated. Discounting casual earnings by 20 per cent effectively raises the wedge between the FMW and the low-pay threshold for casual employees since casuals now have distinctly higher low-pay thresholds than non-casuals (Table 7). The discounted low-pay threshold based on two-thirds of hourly earnings is now between 21 and 22 per cent above the FMW, while it is between 36 and 37 per cent when three-quarters of median hourly earnings is used as the low-pay cut-off.

[18] An alternative ABS data source based on a household survey is the Employee, Benefits and Trade Union Membership Survey, conducted each August as a supplement to the Labour Force Survey. That source is not used here given the published data do not distinguish juniors from adults. Nevertheless, it is instructive that estimates of average weekly earnings in the main job for all employees from this source are very similar to those from the AWE survey. This suggests that the main source of the difference with the HILDA Survey estimates lies either in sample differences or in differences in the population scope.

4. Descriptive Analysis of Low Pay Transitions

4.1 Without Discounting the Casual Loading

The sample we focus on in this section is a balanced panel of persons from the first four waves of the HILDA Survey (release 4.1) who were aged 21 years or older in wave 1 and who reported positive earnings in their main job. Any persons who were either full-time students or self-employed (including owner managers of incorporated businesses) in wave 1 were also excluded. The broad aim of these sample selection rules is to identify a group of people with strong attachment to the labour force in wave 1 (i.e., adult employees) and then follow their progress in terms of pay (and employment status) over time. From an initial sample of 5,723 adults in wave 1 that were used to define low-pay thresholds in the previous section, these further restrictions leave us with a final sample size of 4,038. Sample sizes disaggregated by both gender and pay status in wave 1 are given in Tables 9 and 10.

Table 9
Balanced Sample Sizes of Low Pay Groups
(2/3 Median as Low-Pay Threshold)

State in wave 1	*Male*	*Female*	*Persons*
Low pay (<2/3 median)	177	206	383
Semi-low pay(2/3-3/4 median)	118	170	288
Semi high pay (3/4-4/4 median)	490	677	1167
High pay (>median)	1232	968	2200
All	2017	2021	4038

Table 10
Balanced Sample Sizes of Low Pay Groups
(3/4 Median as Low-Pay Threshold)

State in wave 1	*Male*	*Female*	*Persons*
Low pay (<3/4 median)	295	376	671
Semi high pay (3/4-4/4 median)	490	677	1167
High pay (>median)	1232	968	2200
All	2017	2021	4038

The remainder of this section is dominated by the presentation of transition matrices. Tables 11 to 16 provide snapshot views of the future labour market outcomes of our initial sample of adult employees. In all tables we present figures on the distribution of our sample in waves 2, 3 and 4 by labour force status, distinguishing between employment as a wage and salary earner (i.e., employee), other employed outcomes (such as self-employment), unemployment and not in the labour force, and for employees, by their position in the earnings distribution. The figures in every row must therefore sum to 100 per cent.

Tables 11 and 12 begin by using a measure of earnings distribution that simply divides the sample of employees at each wave into four equal quartiles. It is a measure of an employee's relative position in the wage distribution. If everyone's wage increases proportionately so that everyone's place in the wage distribution remains the same, no movement would be considered to have occurred. Table 11 present figures for all adults while Table 12 presents the same figures disaggregated by sex.

Based on the raw data, it is clear that there exists a considerable amount of state persistence. In other words, individuals who started out in a particular wage quartile in wave 1 were most likely to remain in that quartile from waves 2 to 4. For example, as can be seen in Table 11, of all individuals in the bottom quartile of the wage distribution in wave 1, 48 per cent are likely to remain in the same quartile at wave 2 (see row 1 and column 1 in Table 11). By waves 3 and 4, between 38 and 39 per cent continue to remain in that same bottom quartile of the wage distribution. At the same time, however, there is movement between quartiles, where individuals jump up or down a wage quartile. For example, of all individuals in the bottom quartile of the wage distribution in wave 1, 24 per cent are in the second quartile, 11 per cent are in the third quartile and 3 per cent in the highest quartile by wave 2. In other words by wave 2 just over 37 per cent had moved to the second earnings quintile or above. On the other hand, some individuals in the highest quartile of the wage distribution in wave 1 experience a wage reduction and move to a lower wage quartile. By wave 4, 17 per cent of individuals moved down to the third quartile, while another 8 per cent were in the bottom two quartiles.

Table 11
Transition between Labour Market States, All Adults
(Earnings Quartile Based)

Initial state (Wave 1)	*Earnings quartile*				*EMPO*	*UNE*	*NILF*	*Total*
	(1)	*(2)*	*(3)*	*(4)*				
				Destination as of wave 2				
(1) Bottom quartile	**48.3**	23.8	10.7	2.9	4.1	2.3	7.9	100.0
(2) Second quartile	22.6	**42.5**	19.8	3.8	3.9	1.5	5.9	100.0
(3) Third quartile	7.9	18.7	**44.1**	20.6	3.1	1.2	4.4	100.0
(4) Fourth quartile	2.3	6.4	14.0	**67.0**	5.2	1.4	3.7	100.0
				Destination as of wave 3				
(1) Bottom quartile	**39.5**	25.8	13.8	3.4	5.5	2.2	9.8	100.0
(2) Second quartile	23.2	**38.7**	19.5	4.2	4.3	1.3	8.8	100.0
(3) Third quartile	6.8	18.1	**41.3**	22.8	3.0	1.3	6.7	100.0
(4) Fourth quartile	2.7	5.4	18.2	**62.5**	6.1	0.7	4.4	100.0
				Destination as of wave 4				
(1) Bottom quartile	**38.3**	25.8	12.8	3.0	5.4	3.0	11.7	100.0
(2) Second quartile	18.9	**35.6**	20.2	5.9	7.4	1.3	10.8	100.0
(3) Third quartile	9.3	15.8	**40.0**	21.7	4.7	1.0	7.5	100.0
(4) Fourth quartile	2.8	5.0	16.8	**60.9**	9.1	0.9	4.5	100.0

Notes: Statistics are weighted using longitudinal weights constructed in HILDA (release 4.1) and based on a balanced sample. EMPO denotes "employed: other" and includes the self-employed or full-time students who also worked. UNE denotes unemployed, and NILF denotes not in the labour force. The thresholds for the bottom, second, third, and fourth quartile are $13.52, $17.00, and $22.55 for wave 1, respectively

Not all employees of course will remain employees in the future. About four per cent of our sample had moved into some other form of employment (i.e., self-employment) one year later, and after three years (i.e., by wave 4) this proportion had risen to seven per cent. Of some interest, it appears that employees in the bottom of the earnings distribution are no more or less likely than other workers to become self-employed. They are, however, more likely to not be in work one to three years later, possibly suggesting a discouraged worker effect where individuals who are unable to find jobs decide to leave the labour force altogether. Around 10 per cent of those in the bottom earnings quartile were not in work in wave 2 and almost 15 per cent were not in work in wave 4.

Table 12 depicts the transitions between waves broken down by gender. Although the trends for males and females are broadly similar, two points stand out. First, males appear more likely than females to remain in the highest wage quartile. Approximately 70 per cent of males who are in the highest quartile in wave 1 remain in that quartile between waves 2 and 4. In contrast, only about 50 per cent of females

do so. Second, females are much more likely than males to move out of the labour force over time. For example, just 4 per cent of males in the bottom quartile of the wage distribution in wave 1 had left the labour force by wave 2. This compares with 11 per cent of females.

Table 12
Transition between Labour Market States, By Gender
(Earnings Quartile Based)

	Earnings quartile							
Initial state (wave 1)	*(1)*	*(2)*	*(3)*	*(4)*	*EMPO*	*UNE*	*NILF*	*Total*
Males								
				Destination as of wave 2				
(1) Bottom quartile	**46.6**	27.9	10.7	2.7	5.0	3.0	4.1	100.0
(2) Second quartile	19.4	**41.7**	23.1	5.1	5.3	2.1	3.4	100.0
(3) Third quartile	9.1	18.3	**44.8**	20.2	2.9	0.6	4.2	100.0
(4) Fourth quartile	1.2	4.5	10.7	**74.6**	4.8	1.8	2.4	100.0
				Destination as of wave 3				
(1) Bottom quartile	**40.9**	26.2	15.3	3.5	7.1	2.8	4.2	100.0
(2) Second quartile	21.4	**40.9**	20.1	6.0	5.9	2.0	3.6	100.0
(3) Third quartile	7.8	18.0	**40.7**	22.5	3.8	0.9	6.4	100.0
(4) Fourth quartile	1.6	2.2	16.6	**68.7**	6.6	1.1	3.2	100.0
				Destination as of wave 4				
(1) Bottom quartile	**40.6**	24.2	13.4	4.2	5.6	3.0	9.1	100.0
(2) Second quartile	14.5	**40.8**	20.7	7.4	9.2	1.4	6.0	100.0
(3) Third quartile	7.7	16.4	**39.5**	23.9	5.7	0.9	5.9	100.0
(4) Fourth quartile	1.7	2.9	13.6	**67.1**	10.1	0.7	4.0	100.0
Females								
				Destination as of wave 2				
(1) Bottom quartile	**49.8**	20.4	10.7	3.0	3.3	1.7	11.1	100.0
(2) Second quartile	25.4	**43.3**	17.0	2.7	2.6	1.1	8.0	100.0
(3) Third quartile	6.4	19.2	**43.4**	21.1	3.3	2.0	4.7	100.0
(4) Fourth quartile	4.3	9.9	19.9	**53.2**	6.1	0.7	6.0	100.0
				Destination as of wave 3				
(1) Bottom quartile	**38.3**	25.5	12.6	3.4	4.1	1.7	14.4	100.0
(2) Second quartile	24.7	**36.9**	19.0	2.7	3.0	0.8	13.2	100.0
(3) Third quartile	5.6	18.2	**42.0**	23.1	2.1	1.8	7.2	100.0
(4) Fourth quartile	4.8	11.1	21.1	**51.2**	5.3	0.0	6.7	100.0
				Destination as of wave 4				
(1) Bottom quartile	**36.4**	27.2	12.4	2.1	5.2	3.0	13.8	100.0
(2) Second quartile	22.7	**31.1**	19.7	4.6	5.8	1.2	14.9	100.0
(3) Third quartile	11.2	15.1	**40.6**	19.1	3.5	1.1	9.4	100.0
(4) Fourth quartile	4.9	8.9	22.6	**49.8**	7.4	1.1	5.3	100.0

Notes: Statistics are weighted using longitudinal weights constructed in HILDA (release 4.1) and based on a balanced sample. EMPO denotes "employed: other" and includes the self-employed or full-time students who also worked. UNE denotes unemployed, and NILF denotes not in the labour force. The thresholds for the bottom, second, third, and fourth quartile are $13.52, $17.00, and $22.55 for wave 1, respectively

These gender differences are not surprising, and almost certainly reflect, at least in part, the way responsibilities for childcare (and other household tasks) have traditionally been allocated within the home.

As an alternative to using quartiles of the wage distribution, Tables 13 and 14 define four pay states based on their proximity to the low-pay threshold when defined as two-thirds of the median of hourly earnings. Specifically, we identify four separate pay categories: (i) low paid (earning less than 2/3 median); (ii) semi-low paid (earning between 2/3 and 3/4 of the median); (iii) semi-high paid (earning between 3/4 of the median and the median); and (iv) high paid (earning more than the median).

Table 13
Transition between Labour Market States, All Adults
(Low Pay Based, 2/3 Median Threshold)

	Pay state							
Initial state (wave 1)	*(1)*	*(2)*	*(3)*	*(4)*	*EMPO*	*UNE*	*NILF*	*Total*
			Destination as of wave 2					
(1) Low paid (<2/3med)	**28.5**	14.3	26.4	14.0	4.7	1.9	10.2	100.0
(2) Semi-low paid (2/3-3/4)	19.0	**25.0**	30.9	12.1	4.5	1.8	6.8	100.0
(3) Semi-high paid (3/4-4/4)	6.5	11.0	**49.5**	21.6	3.6	1.9	5.9	100.0
(4) High paid	1.9	2.1	13.9	**72.7**	4.1	1.3	4.0	100.0
			Destination as of wave 3					
(1) Low paid (<2/3med)	**26.8**	11.3	26.5	15.1	6.4	2.5	11.4	100.0
(2) Semi-low paid (2/3-3/4)	18.3	**13.9**	33.5	15.8	6.6	1.4	10.4	100.0
(3) Semi-high paid (3/4-4/4)	7.2	7.9	**48.3**	22.9	3.9	1.5	8.3	100.0
(4) High paid	1.6	1.9	13.5	**71.9**	4.6	1.0	5.6	100.0
			Destination as of wave 4					
(1) Low paid (<2/3med)	**23.2**	7.8	30.1	15.6	5.4	4.3	13.5	100.0
(2) Semi-low paid (2/3-3/4)	15.1	**14.8**	32.2	17.2	6.9	2.4	11.4	100.0
(3) Semi-high paid (3/4-4/4)	5.6	8.2	**44.1**	23.7	6.5	1.4	10.4	100.0
(4) High paid	2.0	2.3	12.2	**69.6**	6.9	0.9	6.0	100.0

Notes: Statistics are weighted using longitudinal weights constructed in HILDA (release 4.1) and based on a balanced sample. EMPO denotes "employed: other" and includes the self-employed or full-time students who also worked. UNE denotes unemployed, and NILF denotes not in the labour force.

For the low paid and semi-low paid, although there is some tendency to remain in the same state after wave 1, the magnitude of the state persistence is less than when using an earnings quartile based definition (Tables 11 and 12). Of those in the low paid category in wave 1, only 29 per cent remained in the same state by wave 2 (Table 13) as compared to 48 per cent when using the lowest wage quartile (Table 11). Thus, as a

result of slicing the data using a different approach, it is possible to obtain somewhat different quantitative results. Note that the discrepancy in state persistence between

Table 14
Transition between Labour Market States, By Gender
(Low Pay Based, 2/3 Median Threshold)

	Pay state							
Initial state (wave 1)	*(1)*	*(2)*	*(3)*	*(4)*	*EMPO*	*UNE*	*NILF*	*Total*
Males								
				Destination as of wave 2				
(1) Low paid (<2/3med)	**29.1**	14.7	31.3	12.7	5.6	0.9	5.8	100.0
(2) Semi-low paid (2/3-3/4)	20.0	**23.0**	31.3	15.2	5.5	3.6	1.4	100.0
(3) Semi-high paid (3/4-4/4)	4.0	9.4	**50.2**	25.1	4.9	2.9	3.5	100.0
(4) High paid	1.8	2.1	12.1	**75.6**	3.9	1.3	3.2	100.0
				Destination as of wave 3				
(1) Low paid (<2/3med)	**29.6**	10.7	28.3	17.0	7.1	1.9	5.5	100.0
(2) Semi-low paid (2/3-3/4)	19.1	**12.9**	33.8	19.5	9.2	2.4	3.0	100.0
(3) Semi-high paid (3/4-4/4)	7.2	7.5	**49.1**	24.6	5.6	2.6	3.5	100.0
(4) High paid	1.6	1.6	11.1	**74.8**	5.3	1.0	4.6	100.0
				Destination as of wave 4				
(1) Low paid (<2/3med)	**20.0**	11.5	31.6	18.3	5.0	3.4	10.4	100.0
(2) Semi-low paid (2/3-3/4)	18.0	**14.7**	28.4	19.6	6.9	3.5	9.0	100.0
(3) Semi-high paid (3/4-4/4)	6.2	5.0	**47.3**	25.5	8.5	1.5	6.1	100.0
(4) High paid	1.4	2.0	10.3	**72.6**	8.0	0.8	4.9	100.0
Females								
				Destination as of wave 2				
(1) Low paid (<2/3med)	**27.8**	13.9	21.3	15.5	3.8	3.0	14.8	100.0
(2) Semi-low paid (2/3-3/4)	18.2	**26.4**	30.7	9.8	3.8	0.4	10.7	100.0
(3) Semi-high paid (3/4-4/4)	8.5	12.3	**48.9**	18.8	2.5	1.1	7.9	100.0
(4) High paid	2.0	2.0	16.7	**68.3**	4.5	1.4	5.1	100.0
				Destination as of wave 3				
(1) Low paid (<2/3med)	**23.9**	11.9	24.7	13.2	5.8	3.2	17.3	100.0
(2) Semi-low paid (2/3-3/4)	17.7	**14.6**	33.3	13.1	4.7	0.7	15.9	100.0
(3) Semi-high paid (3/4-4/4)	7.2	8.3	**47.7**	21.5	2.5	0.7	12.2	100.0
(4) High paid	1.6	2.3	17.0	**67.7**	3.5	1.0	7.0	100.0
				Destination as of wave 4				
(1) Low paid (<2/3med)	**26.6**	4.1	28.6	12.8	5.9	5.3	16.8	100.0
(2) Semi-low paid (2/3-3/4)	13.0	**14.8**	35.0	15.5	6.9	1.6	13.1	100.0
(3) Semi-high paid (3/4-4/4)	5.1	10.9	**41.5**	22.3	5.0	1.3	13.9	100.0
(4) High paid	2.9	2.9	15.1	**65.2**	5.2	1.1	7.6	100.0

Notes: Statistics are weighted using longitudinal weights constructed in HILDA (release 4.1) and based on a balanced sample. EMPO denotes "employed: other" and includes the self-employed or full-time students who also worked. UNE denotes unemployed, and NILF denotes not in the labour force.

Table 11 and Table 13 is easily accounted for. As there is a higher concentration of low-wage workers than high-wage workers in the wage distribution, the bottom quartile of the wage distribution by definition will include individuals who have close to median earnings. Therefore, it is relatively easier to move out of the "low paid" category in Table 13 than it is to move out of the "bottom quartile" in Table 11.

Overall, regardless of whether the low-pay threshold is defined using wage quartiles or median hourly pay, it appears that there exists some state persistence for persons in the top and bottom groups.

Tables 15 and 16 are similar to Tables 13 and 14 but use the 3/4 median low-pay threshold to define low-paid workers. Using the 3/4 median low-pay threshold gives rise to raw estimates of state persistence that are more similar to those in Tables 11 and 12 when low pay transitions were analysed based on earnings quartiles. All the same, the qualitative picture of the wage transitions experienced by workers is similar whether the 2/3 or 3/4 median low-pay threshold is used.

Table 15
Transition between Labour Market States, All Adults
(Low Pay Based, 3/4 Median Threshold)

	Pay state						
Initial state (wave 1)	*(2)*	*(3)*	*(4)*	*EMPO*	*UNE*	*NILF*	*Total*
			Destination as of wave 2				
(2) Low paid (<3/4 med)	**43.3**	28.3	13.2	4.6	1.9	8.8	100.0
(3) Semi-high paid (3/4-4/4)	17.5	**49.5**	21.6	3.6	1.9	5.9	100.0
(4) High paid	4.0	13.9	**72.7**	4.1	1.3	4.0	100.0
			Destination as of wave 3				
(2) Low paid (<3/4 med)	**35.6**	29.4	15.4	6.5	2.1	11.0	100.0
(3) Semi-high paid (3/4-4/4)	15.1	**48.3**	22.9	3.9	1.5	8.3	100.0
(4) High paid	3.4	13.5	**71.9**	4.6	1.0	5.6	100.0
			Destination as of wave 4				
(2) Low paid (<3/4 med)	**30.6**	31.0	16.3	6.0	3.5	12.6	100.0
(3) Semi-high paid (3/4-4/4)	13.8	**44.1**	23.7	6.5	1.4	10.4	100.0
(4) High paid	4.3	12.2	**69.6**	6.9	0.9	6.0	100.0

Notes: Statistics are weighted using longitudinal weights constructed in HILDA (release 4.1) and based on a balanced sample. EMPO denotes "employed: other" and includes the self-employed or full-time students who also worked. UNE denotes unemployed, and NILF denotes not in the labour force.

Table 16
Transition between Labour Market States, By Gender
(Low Pay Based, 3/4 Median Threshold)

	Pay state						
Initial state (wave 1)	*(2)*	*(3)*	*(4)*	*EMPO*	*UNE*	*NILF*	*Total*
Males							
			Destination as of wave 2				
(2) Low paid (<3/4 med)	**43.5**	31.3	13.6	5.5	1.9	4.2	100.0
(3) Semi-high paid (3/4-4/4)	13.4	**50.2**	25.1	4.9	2.9	3.5	100.0
(4) High paid	4.0	12.1	**75.6**	3.9	1.3	3.2	100.0
			Destination as of wave 3				
(2) Low paid (<3/4 med)	**37.2**	30.4	17.9	7.9	2.1	4.6	100.0
(3) Semi-high paid (3/4-4/4)	14.6	**49.1**	24.6	5.6	2.6	3.5	100.0
(4) High paid	3.2	11.1	**74.8**	5.3	1.0	4.6	100.0
			Destination as of wave 4				
(2) Low paid (<3/4 med)	**31.9**	30.4	18.8	5.7	3.4	9.9	100.0
(3) Semi-high paid (3/4-4/4)	11.2	**47.3**	25.5	8.5	1.5	6.1	100.0
(4) High paid	3.4	10.3	**72.6**	8.0	0.8	4.9	100.0
Females							
			Destination as of wave 2				
(2) Low paid (<3/4 med)	**43.0**	25.5	12.9	3.8	1.8	12.9	100.0
(3) Semi-high paid (3/4-4/4)	20.9	**48.9**	18.8	2.5	1.1	7.9	100.0
(4) High paid	4.0	16.7	**68.3**	4.5	1.4	5.1	100.0
			Destination as of wave 3				
(2) Low paid (<3/4 med)	**34.2**	28.6	13.2	5.3	2.1	16.7	100.0
(3) Semi-high paid (3/4-4/4)	15.5	**47.7**	21.5	2.5	0.7	12.2	100.0
(4) High paid	3.8	17.0	**67.7**	3.5	1.0	7.0	100.0
			Destination as of wave 4				
(2) Low paid (<3/4 med)	**29.4**	31.5	14.0	6.4	3.6	15.1	100.0
(3) Semi-high paid (3/4-4/4)	16.0	**41.5**	22.3	5.0	1.3	13.9	100.0
(4) High paid	5.7	15.1	**65.2**	5.2	1.1	7.6	100.0

Notes: Statistics are weighted using longitudinal weights constructed in HILDA (release 4.1) and based on a balanced sample. EMPO denotes "employed: other" and includes the self-employed or full-time students who also worked. UNE denotes unemployed, and NILF denotes not in the labour force.

4.2 Discounting the Casual Loading

The alternative low-pay definition used in this section accounts for the loading paid to casual employees. More specifically, hourly wage rates for casual employees, as reported in the data, are assumed to include a 20% loading. Section 3.4 discusses in more detail how the adjustment for the casual loading is made. In short, we first adjust the distribution of wages by taking out the loading for casuals, compute the median based on this distribution and then add back the 20% loading for casuals to obtain separate low-pay thresholds for non-casuals and casuals respectively.

The tables given below reproduce Tables 9 to 16 in the previous section, but use the alternative definition of low pay where the casual loading is discounted. Recall that by construction, this alternative definition draws more casual employees into the low-paid group and thus increases its overall size (i.e., compare Tables 9 and 10 with Tables 17 and 18).

Table 17
Balanced Sample Sizes of Low Pay Groups with Casual Discounting
(2/3 Median as Low-Pay Threshold)

State in Wave 1	*Male*	*Female*	*Persons*
Low pay (<2/3 median)	194	255	449
Semi-low pay(2/3-3/4 median)	103	159	262
Semi high pay (3/4-4/4 median)	477	645	1,122
High pay (>median)	1243	962	2205
All	2017	2021	4038

Table 18
Balanced Sample Sizes of Low Pay Groups with Casual Discounting
(3/4 Median as Low-Pay Threshold)

State in Wave 1	*Male*	*Female*	*Persons*
Low pay (<3/4 median)	297	414	711
Semi high pay (3/4-4/4 median)	477	645	1,122
High pay (>median)	1243	962	2205
All	2017	2021	4038

Table 19

Transition between Labour Market States with Casual Discounting, All Adults (Earnings Quartile Based)

	Earnings quartile							
Initial state (Wave 1)	*(1)*	*(2)*	*(3)*	*(4)*	*EMPO*	*UNE*	*NILF*	*Total*
				Destination as of wave 2				
(1) Bottom quartile	**48.1**	23.8	9.7	2.2	5.2	2.4	8.7	100.0
(2) Second quartile	19.1	**45.3**	21.2	4.6	3.3	1.7	5.0	100.0
(3) Third quartile	7.5	19.1	**45.6**	19.2	3.1	1.0	4.6	100.0
(4) Fourth quartile	2.5	4.1	14.3	**69.3**	4.7	1.5	3.6	100.0
				Destination as of wave 3				
(1) Bottom quartile	**40.8**	25.2	12.0	2.7	6.1	2.2	10.9	100.0
(2) Second quartile	19.4	**39.3**	23.7	4.5	3.8	1.4	8.0	100.0
(3) Third quartile	6.0	18.7	**42.5**	21.6	3.3	1.2	6.8	100.0
(4) Fourth quartile	2.9	3.6	18.3	**64.6**	5.7	0.7	4.1	100.0
				Destination as of wave 4				
(1) Bottom quartile	**36.0**	25.8	12.7	2.7	6.6	3.2	12.9	100.0
(2) Second quartile	17.4	**37.9**	21.0	6.7	6.3	1.1	9.7	100.0
(3) Third quartile	7.6	17.3	**39.9**	21.8	5.0	0.9	7.5	100.0
(4) Fourth quartile	3.1	4.2	15.1	**63.5**	8.6	1.0	4.5	100.0

Notes: Statistics are weighted using longitudinal weights constructed in HILDA (release 4.1) and based on a balanced sample. EMPO denotes "employed: other" and includes the self-employed or full-time students who also worked. UNE denotes unemployed, and NILF denotes not in the labour force. The thresholds for the bottom, second, third, and fourth quartile are $12.93, $16.47, and $22.22 for wave 1, respectively

Table 20
Transition between Labour Market States with Casual Discounting, By Gender (Earnings Quartile Based)

	Earnings quartile							
Initial state (wave 1)	*(1)*	*(2)*	*(3)*	*(4)*	*EMPO*	*UNE*	*NILF*	*Total*
Males								
				Destination as of wave 2				
(1) Bottom quartile	**45.7**	26.1	11.3	2.4	6.7	2.7	5.1	100.0
(2) Second quartile	16.0	**45.4**	24.4	5.5	4.0	2.0	2.7	100.0
(3) Third quartile	7.3	16.3	**47.0**	22.5	3.4	0.6	3.0	100.0
(4) Fourth quartile	1.3	2.4	11.0	**77.8**	4.2	1.7	1.7	100.0
				Destination as of wave 3				
(1) Bottom quartile	**39.8**	26.9	13.7	3.0	7.8	2.7	6.2	100.0
(2) Second quartile	17.2	**39.7**	26.7	6.0	4.7	1.8	4.0	100.0
(3) Third quartile	6.0	16.1	**45.3**	24.3	3.8	0.9	3.6	100.0
(4) Fourth quartile	1.7	2.1	14.9	**70.6**	5.9	0.9	3.9	100.0
				Destination as of wave 4				
(1) Bottom quartile	**36.3**	24.7	13.7	4.6	7.0	2.7	11.0	100.0
(2) Second quartile	13.2	**39.4**	24.7	9.0	6.7	1.3	5.7	100.0
(3) Third quartile	6.6	17.0	**39.5**	25.7	6.4	0.6	4.3	100.0
(4) Fourth quartile	1.6	3.1	12.7	**68.9**	8.6	0.7	4.5	100.0
Females								
				Destination as of wave 2				
(1) Bottom quartile	**50.1**	21.1	8.3	2.8	3.4	1.6	12.8	100.0
(2) Second quartile	20.5	**46.3**	18.5	4.2	2.9	1.5	6.3	100.0
(3) Third quartile	6.6	19.5	**45.7**	18.3	3.2	1.6	5.1	100.0
(4) Fourth quartile	4.8	5.8	20.4	**56.6**	5.9	0.7	5.8	100.0
				Destination as of wave 3				
(1) Bottom quartile	**40.0**	24.4	10.2	3.0	4.4	1.8	16.4	100.0
(2) Second quartile	22.2	**39.8**	21.4	3.1	2.4	0.9	10.3	100.0
(3) Third quartile	5.7	18.4	**42.5**	20.3	2.7	1.5	9.0	100.0
(4) Fourth quartile	5.2	6.3	21.2	**56.6**	5.0	0.0	5.7	100.0
				Destination as of wave 4				
(1) Bottom quartile	**36.3**	24.9	11.3	2.4	6.0	3.2	15.9	100.0
(2) Second quartile	20.7	**36.5**	19.1	5.0	5.2	0.8	12.6	100.0
(3) Third quartile	9.5	16.7	**40.0**	19.1	3.5	1.4	9.7	100.0
(4) Fourth quartile	6.4	6.1	17.8	**56.3**	7.0	1.2	5.0	100.0

Notes: Statistics are weighted using longitudinal weights constructed in HILDA (release 4.1) and based on a balanced sample. EMPO denotes "employed: other" and includes the self-employed or full-time students who also worked. UNE denotes unemployed, and NILF denotes not in the labour force. The thresholds for the bottom, second, third, and fourth quartile are $12.93, $16.47, and $22.22 for wave 1, respectively

Table 21
Transition between Labour Market States with Casual Discounting, All Adults (Low Pay Based, 2/3 Median Threshold)

	Pay state							
Initial state (wave 1)	*(1)*	*(2)*	*(3)*	*(4)*	*EMPO*	*UNE*	*NILF*	*Total*
				Destination as of wave 2				
(1) Low paid (<2/3med)	**32.6**	12.7	22.7	13.6	5.0	2.80	10.7	100.0
(2) Semi-low paid (2/3-3/4)	19.9	**22.5**	36.8	9.2	5.0	0.91	5.7	100.0
(3) Semi-high paid (3/4-4/4)	7.4	9.1	**49.3**	23.0	3.7	1.94	5.5	100.0
(4) High paid	2.1	2.2	12.2	**74.2**	3.9	1.22	4.1	100.0
				Destination as of wave 3				
(1) Low paid (<2/3med)	**26.8**	12.7	23.2	14.2	7.6	3.49	12.0	100.0
(2) Semi-low paid (2/3-3/4)	12.8	**17.4**	40.0	13.7	5.6	0.74	9.9	100.0
(3) Semi-high paid (3/4-4/4)	8.7	8.7	**43.2**	26.2	3.7	1.33	8.2	100.0
(4) High paid	2.0	1.6	12.3	**73.3**	4.5	0.96	5.5	100.0
				Destination as of wave 4				
(1) Low paid (<2/3med)	**22.1**	11.6	26.2	16.0	5.9	4.55	13.7	100.0
(2) Semi-low paid (2/3-3/4)	13.9	**11.4**	36.8	14.0	9.5	1.96	12.4	100.0
(3) Semi-high paid (3/4-4/4)	6.5	8.4	**42.3**	25.6	6.0	1.19	10.0	100.0
(4) High paid	1.9	2.2	12.0	**70.2**	6.8	0.96	6.0	100.0

Notes: Statistics are weighted using longitudinal weights constructed in HILDA (release 4.1) and based on a balanced sample. EMPO denotes "employed: other" and includes the self-employed or full-time students who also worked. UNE denotes unemployed, and NILF denotes not in the labour force.

Table 22
Transition between Labour Market States with Casual Discounting, By Gender
(Low Pay Based, 2/3 Median Threshold)

	Pay state							
Initial state (wave 1)	*(1)*	*(2)*	*(3)*	*(4)*	*EMPO*	*UNE*	*NILF*	*Total*
Males								
				Destination as of wave 2				
(1) Low paid (<2/3med)	**27.6**	16.2	27.3	13.6	6.4	3.2	5.7	100.0
(2) Semi-low paid (2/3-3/4)	17.5	**21.7**	43.3	7.9	6.3	2.1	1.2	100.0
(3) Semi-high paid (3/4-4/4)	6.8	7.6	**47.8**	27.0	5.0	2.4	3.4	100.0
(4) High paid	1.8	2.0	11.0	**77.2**	3.6	1.2	3.2	100.0
				Destination as of wave 3				
(1) Low paid (<2/3med)	**24.0**	14.0	24.8	18.1	9.4	4.5	5.2	100.0
(2) Semi-low paid (2/3-3/4)	11.5	**15.7**	45.9	14.7	8.2	0.6	3.4	100.0
(3) Semi-high paid (3/4-4/4)	9.5	6.8	**42.4**	29.3	5.4	1.8	4.9	100.0
(4) High paid	1.9	1.1	10.7	**76.1**	5.1	1.1	4.0	100.0
				Destination as of wave 4				
(1) Low paid (<2/3med)	**22.6**	12.5	27.1	19.1	4.4	4.2	10.2	100.0
(2) Semi-low paid (2/3-3/4)	9.3	**9.5**	41.2	14.4	16.5	1.5	7.6	100.0
(3) Semi-high paid (3/4-4/4)	6.9	6.1	**42.5**	29.3	6.8	1.7	6.6	100.0
(4) High paid	1.2	1.2	10.9	**73.2**	8.0	0.7	4.8	100.0
Females								
				Destination as of wave 2				
(1) Low paid (<2/3med)	**37.1**	9.6	18.4	13.5	3.8	2.4	15.3	100.0
(2) Semi-low paid (2/3-3/4)	21.6	**23.1**	31.8	10.3	4.1	0.0	9.1	100.0
(3) Semi-high paid (3/4-4/4)	8.0	10.2	**50.6**	19.8	2.6	1.5	7.2	100.0
(4) High paid	2.6	2.6	14.1	**69.8**	4.3	1.2	5.4	100.0
				Destination as of wave 3				
(1) Low paid (<2/3med)	**29.4**	11.5	21.7	10.5	6.1	2.6	18.2	100.0
(2) Semi-low paid (2/3-3/4)	13.8	**18.6**	35.4	12.9	3.6	0.9	14.9	100.0
(3) Semi-high paid (3/4-4/4)	8.2	10.2	**43.7**	23.7	2.3	1.0	11.0	100.0
(4) High paid	2.0	2.2	14.6	**69.1**	3.7	0.8	7.6	100.0
				Destination as of wave 4				
(1) Low paid (<2/3med)	**21.7**	10.8	25.4	13.1	7.2	4.9	16.8	100.0
(2) Semi-low paid (2/3-3/4)	17.4	**12.9**	33.5	13.6	4.2	2.3	16.1	100.0
(3) Semi-high paid (3/4-4/4)	6.2	10.3	**42.2**	22.6	5.3	0.8	12.7	100.0
(4) High paid	2.9	3.6	13.5	**65.8**	5.0	1.3	7.8	100.0

Notes: Statistics are weighted using longitudinal weights constructed in HILDA (release 4.1) and based on a balanced sample. EMPO denotes "employed: other" and includes the self-employed or full-time students who also worked. UNE denotes unemployed, and NILF denotes not in the labour force.

Table 23
Transition between Labour Market States with Casual Discounting, All Adults (Low Pay Based, 3/4 Median Threshold)

	Pay state						
Initial state (wave 1)	*(2)*	*(3)*	*(4)*	*EMPO*	*UNE*	*NILF*	*Total*
			Destination as of wave 2				
(2) Low paid (<3/4 med)	**44.3**	27.6	12.1	5.0	2.1	9.0	100.0
(3) Semi-high paid (3/4-4/4)	16.5	**49.3**	23.0	3.7	1.9	5.5	100.0
(4) High paid	4.3	12.2	**74.2**	3.9	1.2	4.1	100.0
			Destination as of wave 3				
(2) Low paid (<3/4 med)	**36.3**	29.0	14.0	6.9	2.5	11.3	100.0
(3) Semi-high paid (3/4-4/4)	17.4	**43.2**	26.2	3.7	1.3	8.2	100.0
(4) High paid	3.5	12.3	**73.3**	4.5	1.0	5.5	100.0
			Destination as of wave 4				
(2) Low paid (<3/4 med)	**30.8**	29.9	15.3	7.2	3.7	13.2	100.0
(3) Semi-high paid (3/4-4/4)	15.0	**42.3**	25.6	6.0	1.2	10.0	100.0
(4) High paid	4.1	12.0	**70.2**	6.8	1.0	6.0	100.0

Notes: Statistics are weighted using longitudinal weights constructed in HILDA (release 4.1) and based on a balanced sample. EMPO denotes "employed: other" and includes the self-employed or full-time students who also worked. UNE denotes unemployed, and NILF denotes not in the labour force.

Table 24
Transition between Labour Market States with Casual Discounting, By Gender
(Low Pay Based, 3/4 Median Threshold)

	Pay state						
Initial state (wave 1)	*(2)*	*(3)*	*(4)*	*EMPO*	*UNE*	*NILF*	*Total*
Males							
			Destination as of wave 2				
(2) Low paid (<3/4 med)	**42.3**	32.5	11.7	6.3	2.9	4.2	100.0
(3) Semi-high paid (3/4-4/4)	14.4	**47.8**	27.0	5.0	2.4	3.4	100.0
(4) High paid	3.8	11.0	**77.2**	3.6	1.2	3.2	100.0
			Destination as of wave 3				
(2) Low paid (<3/4 med)	**34.5**	31.7	17.0	9.0	3.2	4.6	100.0
(3) Semi-high paid (3/4-4/4)	16.2	**42.4**	29.3	5.4	1.8	4.9	100.0
(4) High paid	3.1	10.7	**76.1**	5.1	1.1	4.0	100.0
			Destination as of wave 4				
(2) Low paid (<3/4 med)	**29.8**	31.7	17.6	8.4	3.3	9.3	100.0
(3) Semi-high paid (3/4-4/4)	13.0	**42.5**	29.3	6.8	1.7	6.6	100.0
(4) High paid	2.4	10.9	**73.2**	8.0	0.7	4.8	100.0
Females							
			Destination as of wave 2				
(2) Low paid (<3/4 med)	**46.0**	23.3	12.3	3.9	1.5	13.0	100.0
(3) Semi-high paid (3/4-4/4)	18.2	**50.6**	19.8	2.6	1.5	7.2	100.0
(4) High paid	5.2	14.1	**69.8**	4.3	1.2	5.4	100.0
			Destination as of wave 3				
(2) Low paid (<3/4 med)	**37.8**	26.8	11.4	5.1	1.9	17.0	100.0
(3) Semi-high paid (3/4-4/4)	18.4	**43.7**	23.7	2.3	1.0	11.0	100.0
(4) High paid	4.2	14.6	**69.1**	3.7	0.8	7.6	100.0
			Destination as of wave 4				
(2) Low paid (<3/4 med)	**31.7**	28.4	13.3	6.1	3.9	16.6	100.0
(3) Semi-high paid (3/4-4/4)	16.5	**42.2**	22.6	5.3	0.8	12.7	100.0
(4) High paid	6.6	13.5	**65.8**	5.0	1.3	7.8	100.0

Notes: Statistics are weighted using longitudinal weights constructed in HILDA (release 4.1) and based on a balanced sample. EMPO denotes "employed: other" and includes the self-employed or full-time students who also worked. UNE denotes unemployed, and NILF denotes not in the labour force.

4.3 Comparison of wage transitions using a discount for the casual loading

Overall, comparing the corresponding tables in sections 4.1 and 4.2, it does not appear to make much of a difference whether the casual discounting is made or not. For example, using a discount for the casual loading, 53.8 per cent of low paid workers make the transition from low pay in wave 1 to high pay in wave 4. This compares with 53.5 per cent using the methodology that does not take into account the casual loading.

Although the numbers are changed a little, qualitatively the description of wage transitions in section 4.1 holds true for section 4.2. These robust findings to alternative low-pay definitions are reassuring and imply that any discussion surrounding low-paid workers need not engage in lengthy discussions regarding the optimal way of defining low-paid workers.

Could the observed transitions in Tables 11 to 16 and Tables 19 to 24 be spurious as a result of measurement error? Given that measurement of hourly earnings based on survey data is prone to measurement error, the probability that the observed transitions are spuriously generated is not zero. This will be especially so for individuals close to the "borders" of each category where even a small change in recorded earnings could move an individual up or down a category. The extent of the problem depends on assumptions regarding the size of the measurement error, as well as the proportion of individuals that report hours worked and earnings with error. While it is acknowledged that measurement error can cause more mobility than there actually is in the transition tables, simulations based on plausible sizes of measurement error (5% to 10% of true earnings) suggest that measurement error does not seriously bias the results reported in the transition tables and figures of earnings trajectories.

Subsequent Labour Market Status of Low Paid Employees

An easy empirical strategy to reduce the impact of measurement error is to average over several years. Table 25 groups all 256 possible histories into 7 broad groups.[19,20] By grouping individuals we can identify persistently high- or low-paid individuals and distinguish between successful exits into high pay and unsuccessful exits. Persistently low-paid are those individuals who are observed in low-paid jobs in each wave, or are in low-paid employment in the first three waves followed by non-employment in the fourth and last wave. Unsuccessful escapees are individuals who start off in low-paid jobs, transition into high-paid jobs or other jobs, but eventually return to low-paid jobs. Both the persistently low paid and the unsuccessful escapees can be regarded as wanting outcomes.

[19] In each wave there are four possible outcomes: low paid (L), high paid (H), not employed (N), and other (O). With four waves that makes a total of 4x4x4x4=256 possible histories.

[20] The appendix contains tree diagrams graphically displaying the various pathways observed in the data.

Permanent exits to high-paid employment are any transition histories that start with being in a low-paid state and end with at least two spells of high-paid employment. This is clearly a desirable outcome and counters the wanting outcomes of being persistently low-paid or being unsuccessful in escaping to high-paid employment. Table 25 classifies the dynamics of low-paid individuals over the four waves in HILDA into the following groups: about 20 per cent are churners of various types and about 11 per cent 'permanently' exit employment. A further 11 per cent are persistently in a low-paid state, a further 10 per cent only temporarily escape low-paid employment and a final 48 per cent 'permanently' escape low-paid employment. When focussing on the two types of outcomes that were identified as 'wanting' and 'desirable' the ratio between these two is about 2 to 5.

Table 25
Classification of Individuals Initially Observed in Low-Paid State (2/3 Median as Low-Pay Threshold, With Discounting the Casual Loading)

Persistently low paid	**11.4**	**'Permanent' exits out of employment**	**11.2**
LLLL	9.8	LNNN+LLNN+LHNN+LONN	
LLLN	1.5		
Unsuccessful escapees	**10.4**	**Other churners between L & N**	**2.5**
LHLL+LHHL+LOLL+LLHL+ LOHL+LHOL+LOOL+LHNL+ LLOL+LNHL		LNLN+LNLL+LOLN+ LNNL+LLNL+LNNO	
'Permanent' exits into high pay	**47.6**	**Other churners between L & H**	**11.5**
LHHH+LLHH	38.6	LHLH+LHLO+LOLH+LLNH+ LHON+LLLH	
LHHO+LHOO+LHOH+LOOH +LOHH+LOOO+LHNH+LLOO +LNHO+LNHH+LNOO+LNOH +LLOH+LLHO	9.0	**Others** (mostly combinations of L,H and N)	**5.5**

Notes: Statistics are weighted using longitudinal weights constructed in HILDA (release 4.1) and based on a balanced sample. O denotes "employed: other" and includes the self-employed or full-time students who also worked. N denotes not employed. L and H denote low and high paid, respectively.

Another approach to observing the complex movement of people in and out of low paid employment is the use of transitional trees. One of the major findings of this analysis is that around three quarters of those that move from low pay in wave 1 to

high pay in wave 2 are also in high pay in wave 3. Further, less than a fifth of those who progressed from low pay in wave 1 to high pay in wave 2 had moved back to low pay in wave 4. More detailed analysis of the use of transitional trees is provided in the Appendix.

4.4 Low-paid Employment and Income Support

To what extent is low-paid employment related to income support? Tables 26 and 27 depicts the level of income support reliance for individuals grouped by their relative position in the distribution of hourly earnings when not discounting and discounting the casual loading, respectively. The sample used is the unbalanced sample of all adult employees, excluding full-time students. Income support reliance in the table is measured using a measure referred to as the Total Proportion of Income (TPI) from income support (excluding Family Tax Benefits). This is defined as follows:

$$\text{TPI} = \frac{B}{B + Hw + U}$$

where H is hours worked, w is the hourly wage rate (so Hw represents earned income), U is unearned income and B is the amount of income support (excluding Family Tax Benefits). Total income is given by $B + Hw + U$ and TPI can be interpreted as a measure of reliance on income support ranging from 0 (where $B = 0$ and there is no dependence on income support at all) to 1 (where $Hw + U = 0$ and there is practically total dependence on income support, as income consists exclusively of welfare payments).[21] TPI is then a continuous index which takes the values $0 \leq \text{TPI} \leq 1$ for all individuals in the labour market

Comparing individuals earning less than 2/3 median hourly earnings with those earning more than the median, it is clear that there is a negative correlation between hourly pay and reliance on income support. For example, based on the results without discounting (Table 26) those earning less than 2/3 median hourly earnings have a mean TPI of 0.125 whereas those earning more than the median have a mean TPI of only 0.013. Using a binary indicator to denote receipt of any form of income support is another way of measuring income support reliance. The results are similar.

[21] Barr and Hall (1981) first introduced a model along these lines trying to explain dependence on public assistance in the US.

Table 26
Low Pay and Income Support Reliance without Casual Discounting

	<2/3 median	*2/3-3/4 median*	*3/4-4/4 median*	*> median*
All				
TPI mean	0.125	0.052	0.041	0.013
% if TPI>0	28.3	15.4	13.0	6.4
TPI mean given TPI>0	0.440	0.336	0.316	0.209
% on income support	19.4	9.2	6.5	3.0
% Unemployment Benefits	5.2	2.4	1.3	0.6
% on DSP	4.9	0.5	0.5	0.2
% on Parenting Payments	4.6	4.4	2.6	0.8
% Other IS	4.7	1.8	2.1	1.4
Single persons				
TPI mean	0.176	0.082	0.067	0.029
% if TPI>0	38.2	22.1	20.2	11.8
TPI mean given TPI>0	0.461	0.372	0.334	0.249
% on income support	27.7	16.2	11.3	5.6
% Unemployment Benefits	7.3	4.2	2.5	1.3
% on DSP	7.8	0.8	0.7	0.3
% on Parenting Payments	7.6	9.7	6.2	2.6
% Other IS	5.1	1.5	1.9	1.4
Coupled persons				
TPI mean	0.083	0.033	0.026	0.008
% if TPI>0	20.3	11.3	9.0	4.5
TPI mean given TPI>0	0.407	0.292	0.294	0.172
% on income support	12.6	4.8	3.9	2.1
% Unemployment Benefits	3.4	1.4	0.7	0.3
% on DSP	2.6	0.4	0.4	0.2
% on Parenting Payments	2.2	1.1	0.7	0.2
% Other IS	4.4	2.0	2.2	1.4

Notes: Statistics are based on a pooled sample of wave 1 to 4 (HILDA release 4.1) and are weighted using the responding person population weights. The sample include all adult non-full-time student employees (21 +) who are present in any period within the four periods. TPI is the proportion of total income (private income +income support payments (excluding Family Tax Benefits)) derived from income support payments (excluding Family Tax Benefits).. In the case of zero income support payments, and zero private income, TPI is set to 0. In case of negative private income and positive income support payments, TPI is bounded to 1.

Of those earning less than 2/3 median hourly earnings, 19.4 per cent were receiving some form of income support whereas 3 per cent of those with more than median earnings were on income support. Applying the casual discount (Table 27) leads to very similar results.

More analysis on the relationship between income support and low-paid employment is done in section 5.3 in a multivariate context.

Table 27
Low Pay and Income Support Reliance with Casual Discounting

	<2/3 median	*2/3-3/4 median*	*3/4-4/4 median*	*> median*
All				
TPI mean	0.133	0.068	0.032	0.011
% if TPI>0	30.5	18.0	11.7	5.6
TPI mean given TPI>0	0.436	0.381	0.277	0.188
% on income support	21.0	9.8	5.7	2.5
% Unemployment Benefits	6.3	2.6	0.9	0.4
% on DSP	4.4	0.8	0.5	0.2
% on Parenting Payments	5.8	3.5	2.6	0.7
% Other IS	4.6	2.9	1.8	1.3
Single persons				
TPI mean	0.193	0.104	0.054	0.022
% if TPI>0	41.6	26.1	18.2	9.9
TPI mean given TPI>0	0.463	0.396	0.296	0.220
% on income support	31.3	16.3	9.8	4.4
% Unemployment Benefits	9.4	4.9	1.5	0.8
% on DSP	7.0	1.3	0.6	0.3
% on Parenting Payments	10.2	7.2	6.1	2.1
% Other IS	4.7	2.9	1.7	1.3
Coupled persons				
TPI mean	0.087	0.045	0.020	0.007
% if TPI>0	21.9	12.5	8.1	4.2
TPI mean given TPI>0	0.397	0.359	0.253	0.162
% on income support	13.1	5.5	3.4	1.9
% Unemployment Benefits	3.9	1.0	0.6	0.3
% on DSP	2.4	0.4	0.4	0.2
% on Parenting Payments	2.3	1.1	0.6	0.2
% Other IS	4.5	3.0	1.8	1.3

Notes: Statistics are based on a pooled sample of wave 1 to 4 (HILDA release 4.1) and are weighted using the responding person population weights. The sample include all adult non-full-time student employees (21 +) who are present in any period within the four periods. TPI is the proportion of total income (private income +income support payments (excluding Family Tax Benefits)) derived from income support payments (excluding Family Tax Benefits).. In the case of zero income support payments, and zero private income, TPI is set to 0. In case of negative private income and positive income support payments, TPI is bounded to 1.

5. Multivariate Analysis of Low Pay Transitions

The analyses reported in this section continue with the use of the balanced panel from the previous section. Three dynamic panel models are estimated to examine: (i) the state dependence of low pay; (ii) how joblessness is affected by intervening low-paid employment; and (iii) the relationship between low-paid employment and dependency on income support.

The first two models are adaptations of the approach used in Stewart (2005). Both are random effects dynamic panel probit models. The first estimates the state dependence using a first-order model so that low pay employment in $t-1$ is allowed to impact on low pay employment at *t*, while the second uses a second-order model so that employment states in both $t-1$ and $t-2$ are allowed to impact on unemployment at *t*. The third issue requires a slightly different modelling strategy as many income support recipients are often also unemployed or out of the labour force. Dependency on income support is denoted by a summary income support reliance measure that expresses total income support payments as a proportion of total income (TPI), as defined earlier in section 4.4. TPI is then further reclassified into four different categories denoting no, low, medium or high dependence on income support. TPI category is then used as the dependent variable in a multinomial logit model.

5.1 Low Pay State Persistence

The question examined here is how prior low-paid employment experiences can exacerbate the likelihood of staying in low-paid jobs.

The latent equation for the random effects dynamic panel probit model can be written as:

$$y_{it}^{*} = \gamma y_{it-1} + x_{it}'\beta + \alpha_i + u_{it} \qquad \text{(model 1)}$$

where the subscript i = 1, 2, …, N indexes individuals, the subscript t = 2, …, T indexes time periods, y_{it}^{*} is the latent dependent variable for being low paid, x_{it} is a vector of exogenous characteristics, α_i are unobserved individual-specific random effects, and the u_{it} are assumed to be distributed $N(0,\sigma_u^2)$. The observed binary outcome is:

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

In this model, the data are restricted to those persons working as employees with measurable earnings in all four waves. This restriction is necessary so that the '0' refers only to higher pay states and does not refer to states like unemployment or out of the labour force, where it is more difficult to conceptualise progressive movement along a wage distribution. In effect, this is equivalent to focusing on the first four columns of Tables 13 and 14 in all waves, where groups 2, 3 and 4 (2/3 to 3/4 median, 3/4 to median, greater than median) are collapsed into a single 'higher than low pay' group.

The standard random effects model assumes that α_i is uncorrelated with x_{it}. As this is potentially restrictive, we adopt the Mundlak-Chamberlain approach and allow a correlation between α_i and the observed characteristics in the model by assuming a relationship between α_i and the means of the time-varying *x*-variables:

$$\alpha_i = \overline{x_i}' a + \nu_i$$

where ν_i is distributed $N(0, \sigma_\nu^2)$.

An important difference between the model here and the descriptive analysis reported on in section 4 is that in this section, the so-called initial conditions problem is addressed. This problem arises because the start of the observation period (wave 1 in 2001) does not coincide with the start of the stochastic process generating low pay employment experiences. Estimation of the model therefore requires a further assumption about the relationship between y_{i1} and α_i. If the initial conditions are correlated with α_i, as is likely in our context, not addressing the initial conditions problem will lead to overstating the level of state dependence (i.e., the estimate of γ in (1) will be larger than it actually should be).

In model 1, the approach used to address the initial conditions problem follows Heckman (1981) by first specifying a reduced form equation for the initial conditions:

$$y_{i1}^{*} = z_{i1}' \lambda + \eta_i$$

where z_{i1} is a vector of strictly exogenous characteristics, $\text{var}(\eta_i) = \sigma_\eta^2$ and η_i is correlated with α_i but uncorrelated with u_{it} for $t \geq 2$. (In other words, we can write $\eta_i = \theta\alpha_i + u_{i1}$.) In principle, the vector of characteristics in *x* and *z* need not be the same but having suitable instruments in *z* can help with improving identification. From the HILDA Survey data set, we use the following four variables – father employed at age 14, mother employed at age 14, father born overseas, and mother born overseas – as instruments. These variables are pre-first-wave variables and arguably help determine the outcome at $t = 1$ but play less of a direct role for $t \geq 2$. The joint probability of the observed low pay employment sequence for individual *i* given α_i in the Heckman approach is thus:

$$\Phi[(z_{i1}'\lambda + \theta\alpha_i)(2y_{i1} - 1)]\prod_{t=2}^{T}\Phi[\gamma y_{it-1} + x_{it}'\beta + \alpha_i)(2y_{i1} - 1)]$$

This can be expressed in terms of a likelihood function and the parameters of interest can be estimated using maximum likelihood methods.

This model is most appropriate for addressing the issue of whether prior low pay employment experiences exacerbates the likelihood of experiencing low-paid employment in the future (i.e., how permanent a state is low pay). It does so by decomposing the state dependence of low-paid employment into true state dependence (i.e., the scarring effect of low-paid employment) versus unobserved heterogeneity across the units (i.e., differences in individuals) and adds to the findings of the descriptive analyses reported on in the previous section.[22]

The dynamic random effects probit model is estimated four times based on the four possible permutations of the low-pay threshold (2/3 or 3/4) and whether or not the casual loading is discounted (see section 3.4). Estimates based on the first definition (2/3 median as low-pay threshold, not discounting the casual loading) are given in Table 28. The coefficient on lagged low pay is highly statistically significant and

[22] An alternative approach to solve the initial conditions problems based on a suggestion by Wooldridge (2005) was also experimented with to test the robustness of the results of the Heckman approach using the above mentioned exclusion restrictions. In the Wooldridge approach, instead of specifying a separate equation for y_{i1} as in Heckman's approach, the relationship between y_{i1} and α_i is accounted for by modelling the distribution of α_i given y_{i1}. The assumption in Wooldridge's approach is that the distribution of the individual specific effects conditional on the exogenous individual characteristics is correctly specified. We found the qualitative results of both the Heckman and Wooldridge approaches to be very similar.

positive. These results imply that being in a low-paid job in the previous year significantly increases the probability (by about 3 percentage points) that an individual is in a low-paid job in the current year. The coefficient of the interaction of being in a low-paid job in the previous year and having less than a Year 12 education is positive but not statistically different from zero. In other words, it appears that having a low-paid job in the previous year has a similar effect on the probability of having a low-paid job this year for individuals with either less than 12 years of education or more than 12 years of education. The signs on the coefficients of the other variables were generally in the expected direction, but hardly any of them were statistically significant.

When using three-quarters of median hourly earnings as the low-pay threshold instead, and still without discounting for the causal loading (Table 29), the contribution of the effects of being low paid or being unemployed in the previous period increases marginally as compared to Table 28. This is consistent with the comparison of Figures A.1 and A.2 (see appendix), where it was seen that it is more likely that one persists in a low-paid job when the definition based on three-quarters of median hourly earnings is used. Most of the other coefficients in Table 29 retain a similar magnitude and significance level to those reported in Table 28.

When the casual loading is discounted (Tables 30 and 31), compared to the situation without discounting (Tables 28 and 29), the sample of workers considered low paid is over 10 per cent larger (see the various low-pay thresholds in Tables 6 and 7). This is because the bar for a casual worker to be considered as low paid has been set higher. Although the overall sample size used for estimating the four models in Tables 28 to 31 is the same (n = 12,112), in Tables 30 and 31 there is now a re-labelling of some casual workers who were classified as high paid without the discounting (Tables 28 and 29) but who are now classified as low paid with the discounting.

Comparing the results in Tables 28 and 30 which both involve using the two-thirds of median hourly pay threshold but differ in whether the casual loading is discounted, it can be seen that the contribution of the effects of being low paid in the previous period decreases marginally when the discount is made. However, comparing the results in Tables 29 and 31 which similarly both use the three-quarters threshold but differ in whether the casual loading is discounted, there is now a much larger effect of lagged low-paid employment when the casual loading is discounted. The mean

marginal effects of lagged low-paid employment with the discount (Table 31) is nearly twice the magnitude as compared to the situation when the discount is not made (Table 29). Therefore, in model 1, the effect of using two-thirds or three-quarters of median hourly earnings as the low-pay threshold does not seem to affect the effects of being low paid in the previous period as much as the choice of whether the casual loading is discounted or not.

Table 28
Dynamic Random Effects Probit Model for Low Pay Probability (2/3 Median as Low-Pay Threshold, Not Discounting the Casual Loading)

	Coefficients	*Mean Marginal Effects*	*Mean of X*
Low Pay at t-1	0.338***	3.12	0.072
	[0.008]		
Year 11 and below	-0.174	-1.33	0.241
	[0.701]		
Low Pay at t-1* Year 11 and below	0.104	0.87	0.027
	[0.482]		
Male	-0.253***	-2.00	0.526
	[0.000]		
Age 21 to 24	0.346*	3.26	0.043
	[0.056]		
Age 25 to 34	0.091	0.74	0.246
	[0.476]		
Age 35 to 44	-0.193	-1.47	0.343
	[0.135]		
Age 45 to 54	-0.178	-1.36	0.283
	[0.148]		
Married	0.186	1.42	0.732
	[0.297]		
Number of Dependent Children	-0.062	-0.64	0.969
	[0.542]		
Aboriginal or Torres Straits Islander	-0.081	-0.61	0.010
	[0.386]		
Not Born in English Speaking Country	0.337***	3.07	0.105
	[0.003]		
Long Term Health Condition (Limits Work)	-0.327**	-2.25	0.066
	[0.031]		
Major City	0.082	0.64	0.646
	[0.779]		
Inner City	0.326	2.84	0.241
	[0.182]		
NSW	0.089	0.72	0.292
	[0.705]		
VIC	0.291	2.48	0.264
	[0.215]		
QLD	0.218	1.85	0.202
	[0.357]		
SA	0.339	3.11	0.088
	[0.175]		
WA	0.060	0.49	0.092
	[0.811]		
TAS	-0.292	-1.99	0.031
	[0.371]		
Constant	-1.816***		
	[0.000]		
N	12,112		
Log likelihood	-2539.56		
Wald $\chi^2(31)$	213.47		

P-values in brackets. * significant at 10 per cent level, ** at 5 per cent level, and *** at 1 per cent level. Omitted groups are high pay at t-1, female, age 55 plus, 12 or more years of education, outer region and State (other).

Table 29
Dynamic Random Effects Probit Model for Low Pay Probability (3/4 Median as Low-Pay Threshold, Not Discounting the Casual Loading)

	Coefficients	*Mean Marginal Effects*	*Mean of X*
Low Pay at t-1	0.277***	3.68	0.141
	[0.003]		
Year 11 and below	0.208	2.67	0.241
	[0.572]		
Low Pay at t-1* Year 11 and below	-0.031	-0.38	0.055
	[0.785]		
Male	-0.339***	-4.21	0.526
	[0.000]		
Age 21 to 24	0.690***	10.61	0.043
	[0.000]		
Age 25 to 34	0.206*	2.65	0.246
	[0.080]		
Age 35 to 44	-0.066	-0.80	0.343
	[0.576]		
Age 45 to 54	-0.161	-1.95	0.283
	[0.155]		
Married	-0.039	-0.48	0.732
	[0.796]		
Number of Dependent Children	-0.095	-1.60	0.969
	[0.260]		
Aboriginal or Torres Straits Islander	0.190	2.51	0.010
	[0.575]		
Not Born in English Speaking Country	0.267**	3.56	0.105
	[0.016]		
Long Term Health Condition (Limits Work)	-0.346***	-3.85	0.066
	[0.010]		
Major City	0.112	1.37	0.646
	[0.646]		
Inner City	0.192	2.46	0.241
	[0.337]		
NSW	0.198	2.52	0.292
	[0.367]		
VIC	0.415**	5.51	0.264
	[0.058]		
QLD	0.399*	5.35	0.202
	[0.071]		
SA	0.541**	7.77	0.088
	[0.022]		
WA	0.164	2.13	0.092
	[0.490]		
TAS	0.155	2.02	0.031
	[0.576]		
Constant	-1.565***		
	[0.000]		
N	12,112		
Log likelihood	-3922.03		
Wald $\chi^2(31)$	318.07		

P-values in brackets. * significant at 10 per cent level, ** at 5 per cent level, and *** at 1 per cent level. Omitted groups are high pay at t-1, female, age 55 plus, 12 or more years of education, outer region and State (other).

Table 30
Dynamic Random Effects Probit Model for Low Pay Probability (2/3 Median as Low-Pay Threshold, Discounting the Casual Loading)

	Coefficients	*Mean Marginal Effects*	*Mean of X*
Low Pay at t-1	0.342***	2.93	0.080
	[0.005]		
Year 11 and below	-0.134	-0.97	0.241
	[0.770]		
Low Pay at t-1* Year 11 and below	0.108	0.85	0.033
	[0.458]		
Male	-0.333***	-2.48	0.526
	[0.000]		
Age 21 to 24	0.274	2.32	0.043
	[0.153]		
Age 25 to 34	0.125	0.96	0.246
	[0.357]		
Age 35 to 44	-0.187	-1.35	0.343
	[0.169]		
Age 45 to 54	-0.242*	-1.72	0.283
	[0.065]		
Married	-0.324*	2.27	0.732
	[0.076]		
Number of Dependent Children	0.017	0.16	0.969
	[0.866]		
Aboriginal or Torres Straits Islander	0.354	3.12	0.011
	[0.317]		
Not Born in English Speaking Country	0.231*	1.88	0.105
	[0.070]		
Long Term Health Condition (Limits Work)	-0.393**	-2.50	0.066
	[0.013]		
Major City	0.079	0.58	0.646
	[0.798]		
Inner City	0.284*	2.28	0.241
	[0.261]		
NSW	-0.061	-0.45	0.292
	[0.803]		
VIC	0.073	0.55	0.264
	[0.765]		
QLD	0.123	0.95	0.202
	[0.616]		
SA	0.164	1.30	0.088
	[0.533]		
WA	-0.152	-1.06	0.092
	[0.568]		
TAS	-0.236	-1.57	0.031
	[0.466]		
Constant	-1.709***		
	[0.000]		
N	12,112		
Log likelihood	-2634.62		
Wald $\chi^2(31)$	232.69		

P-values in brackets. * significant at 10 per cent level, ** at 5 per cent level, and *** at 1 per cent level. Omitted groups are high pay at t-1, female, age 55 plus, 12 or more years of education, outer region and State (other).

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Table 31
Dynamic Random Effects Probit Model for Low Pay Probability (3/4 Median as Low-Pay Threshold, Discounting the Casual Loading)

	Coefficients	*Mean Marginal Effects*	*Mean of X*
Low Pay at t-1	0.443***	6.32	0.140
	[0.000]		
Year 11 and below	0.076	0.97	0.241
	[0.829]		
Low Pay at t-1* Year 11 and below	-0.030	-0.38	0.058
	[0.785]		
Male	-0.370***	-4.69	0.526
	[0.000]		
Age 21 to 24	0.339**	4.82	0.043
	[0.035]		
Age 25 to 34	0.044	0.55	0.246
	[0.690]		
Age 35 to 44	-0.217**	-2.66	0.343
	[0.045]		
Age 45 to 54	-0.348***	-4.17	0.283
	[0.001]		
Married	0.001	0.02	0.732
	[0.993]		
Number of Dependent Children	-0.062	-1.02	0.969
	[0.448]		
Aboriginal or Torres Straits Islander	0.063	0.82	0.010
	[0.829]		
Not Born in English Speaking Country	0.232**	3.14	0.105
	[0.027]		
Long Term Health Condition (Limits Work)	0.363***	-4.08	0.066
	[0.006]		
Major City	-0.199	2.46	0.646
	[0.402]		
Inner City	0.214	2.82	0.241
	[0.272]		
NSW	0.167	2.17	0.292
	[0.400]		
VIC	0.315	4.21	0.264
	[0.114]		
QLD	0.323	4.38	0.202
	[0.110]		
SA	0.513**	7.54	0.088
	[0.017]		
WA	0.102	1.32	0.092
	[0.638]		
TAS	0.119	1.56	0.031
	[0.641]		
Constant	-1.271***		
	[0.000]		
N	12,112		
Log likelihood	-3885.15		
Wald $\chi^2(31)$	404.56		

P-values in brackets. * significant at 10 per cent level, ** at 5 per cent level, and *** at 1 per cent level. Omitted groups are high pay at t-1, female, age 55 plus, 12 or more years of education, outer region and State (other).

5.2 Churning between Low-paid Employment and Joblessness

The question of whether prior low-paid employment experiences exacerbate the likelihood of experiencing unemployment in the future is best answered using an alternative modelling strategy. This involves using a second-order model so that employment states in both $t-1$ and $t-2$ are allowed to impact on unemployment at *t*. This involves using unemployment as the dependent variable instead of low-paid employment (as in model 1) and including eight dummy variables to account for the nine possible combination of states in periods $t-1$ and $t-2$ in place of the lagged dependent variable. The advantage of such an approach is that interactions of employment states in periods $t-1$ and $t-2$ can be used to help understand the effect of certain pathways or sequences. For example, unemployment followed by low-paid employment might be expected to be associated with a higher probability of unemployment at period *t* than unemployment followed by high-paid employment. The main difference from model 1 is how y_{it}^{*} is specified. Specifically, model 2 takes the following form:

$$y_{it}^{*} = \sum_{k} \gamma_k (s_{it-1})(s_{it-2}) + x_{it}'\beta + \alpha_i + u_{it} \qquad \text{(model 2)}$$

where s_{it-1} is a dummy variable denoting one of the three states (low pay, high pay and unemployed) in time $t-1$ and s_{it-2} is a dummy variable denoting one of the same three states in time $t-2$. As there are three states and nine possible combinations altogether, *k* runs from 1 to 8 reflecting the inclusion of eight dummy interaction variables.

In model 2, the estimation sample is different from the sample used in model 1. In model 1, the sample was restricted to those employed (either in low-pay or high-pay jobs) in all four waves. In model 2, in order to model the dynamics between unemployment and low-pay employment, we also include individuals who were either employed or unemployed during the first four waves of HILDA.

Instead of using the Heckman (1981) approach to the initial conditions problem, model 2 adopts the Wooldridge (2005) approach to model the relationship between y_{i1} and α_i. This simpler approach is adopted as using the Heckman (1981) approach in model 2 requires substantial programming while the Wooldridge (2005) method

only requires standard software. In the Wooldridge approach, instead of specifying a separate equation for y_{i1}, the relationship between y_{i1} and α_i is accounted for by modelling the distribution of α_i given y_{i1}.

As with model 1, four sets of results are presented in the following pages corresponding to the four possible permutations of the low-pay threshold (2/3 or 3/4) and whether or not the casual loading is discounted. Estimates from the second order dynamic random effects probit model based on the first definition (2/3 median as low-pay threshold, not discounting the casual loading) are given in Table 31. The results suggest that an individual unemployed in both $t-1$ and $t-2$ is 26 percentage points more likely to be unemployed at time *t*, relative to an individual who is high paid in both $t-1$ and $t-2$. The effects of unemployment in $t-1$ appear to have stigma effects that negate the effects of having been in a high paid job in $t-2$. This is because the mean marginal effects for individuals who were unemployed at $t-1$ and either in low paid or high paid employment in $t-2$ are very similar (10 to 12 percentage points).

Prior low pay employment experiences does not increase the probability of experiencing unemployment in the future. Individuals in low-paid jobs in both $t-1$ and $t-2$ are not more likely than individuals in high-paid jobs in both $t-1$ and $t-2$ to be unemployed at time *t*. Instead, the best predictor of whether someone is unemployed at time *t* appears to be if they were unemployed at either $t-1$ and $t-2$. From Table 32, it is quite clear that the mean marginal effect of any of the interaction variables that includes either unemployment at $t-1$ or $t-2$ is relatively larger than when they are not included.

Furthermore, the nature of the results do not alter much when the alternative low-pay threshold is used (Table 33), when the casual loading is discounted (Table 34), or when both the alternative low-pay threshold is used and the casual loading is discounted (Table 35).

Table 32
Second Order Dynamic Random Effects Probit Model for Unemployment Probability (2/3 Median as Low-Pay Threshold, Not Discounting for the Casual Loading)

	Coefficients	*Mean Marginal Effects*	*Mean of X*
Unemployment at t-1, Unemployment at t-2	1.971***	26.46	0.011
	[0.000]		
Unemployment at t-1, Low Pay at t-2	1.468***	13.96	0.002
	[0.003]		
Unemployment at t-1, High Pay at t-2	1.271***	10.18	0.011
	[0.000]		
Low Pay at t-1, Unemployment at t-2	1.358***	11.85	0.004
	[0.001]		
High Pay at t-1, Unemployment at t-2	0.664**	3.14	0.016
	[0.018]		
Low Pay at t-1, Low Pay at t-2	0.341	1.22	0.028
	[0.194]		
Low Pay at t-1, High Pay at t-2	0.249	0.83	0.039
	[0.286]		
High Pay at t-1, Low Pay at t-2	0.085	0.25	0.047
	[0.735]		
Initial Unemployment Status	0.661***	3.07	0.036
	[0.007]		
Year 11 and below	-0.179	-0.46	0.242
	[0.812]		
Male	0.132	0.36	0.529
	[0.211]		
Age 21 to 24	-0.144	-0.35	0.027
	[0.672]		
Age 25 to 34	0.014	0.04	0.235
	[0.940]		
Age 35 to 44	-0.082	-0.22	0.334
	[0.670]		
Age 45 to 54	0.130	0.37	0.299
	[0.474]		
Married	-0.115	-0.32	0.726
	[0.696]		
Number of Dependent Children	-0.169	-0.21	0.935
	[0.304]		
Aboriginal or Torres Straits Islander	1.099***	7.63	0.012
	[0.000]		
Not Born in English Speaking Country	0.381***	1.32	0.109
	[0.007]		
Long Term Health Condition (Limits Work)	0.406	1.48	0.081
	[0.103]		
Major City	-0.668	-2.48	0.651
	[0.150]		
Inner City	-0.222	-0.56	0.231
	[0.578]		
NSW	0.702*	2.55	0.291
	[0.097]		
VIC	0.482	1.71	0.264
	[0.258]		
QLD	0.314	1.05	0.204
	[0.466]		
SA	0.224	0.73	0.088
	[0.623]		
WA	0.304	1.05	0.091
	[0.506]		
TAS	0.012	0.03	0.030
	[0.985]		
Constant	-2.974***		
	[0.000]		
N	6,464		
Log likelihood	-378.49		
Wald $\chi^2(34)$	221.95		

P-values in brackets. * significant at 10 per cent level, ** at 5 per cent level, and *** at 1 per cent level. Omitted groups are high pay at t-1 and high pay at t-2, female, age 55 plus, 12 or more years of education, outer region and State (other).

Table 33
Second Order Dynamic Random Effects Probit Model for Unemployment Probability (3/4 Median as Low-Pay Threshold, Not Discounting for the Casual Loading)

	Coefficients	*Mean Marginal Effects*	*Mean of X*
Unemployment at t-1, Unemployment at t-2	2.021***	27.95	0.011
	[0.000]		
Unemployment at t-1, Low Pay at t-2	1.582***	16.13	0.003
	[0.000]		
Unemployment at t-1, High Pay at t-2	1.260***	10.04	0.009
	[0.000]		
Low Pay at t-1, Unemployment at t-2	1.041***	6.98	0.005
	[0.003]		
High Pay at t-1, Unemployment at t-2	0.806***	4.32	0.014
	[0.004]		
Low Pay at t-1, Low Pay at t-2	0.156	0.48	0.069
	[0.464]		
Low Pay at t-1, High Pay at t-2	0.473***	1.83	0.066
	[0.007]		
High Pay at t-1, Low Pay at t-2	0.171	0.53	0.075
	[0.398]		
Initial Unemployment Status	0.655***	3.02	0.036
	[0.006]		
Year 11 and below	-0.221	-0.56	0.242
	[0.766]		
Male	0.146	0.40	0.529
	[0.164]		
Age 21 to 24	-0.192	-0.45	0.027
	[0.576]		
Age 25 to 34	0.005	0.01	0.235
	[0.978]		
Age 35 to 44	-0.077	-0.21	0.334
	[0.688]		
Age 45 to 54	0.131	0.37	0.299
	[0.472]		
Married	-0.137	-0.39	0.726
	[0.639]		
Number of Dependent Children	-0.174	-0.22	0.935
	[0.289]		
Aboriginal or Torres Straits Islander	1.086***	7.45	0.012
	[0.000]		
Not Born in English Speaking Country	0.379***	1.32	0.109
	[0.007]		
Long Term Health Condition (Limits Work)	0.395	1.43	0.081
	[0.110]		
Major City	-0.636	-2.32	0.651
	[0.168]		
Inner City	-0.208	-0.53	0.231
	[0.601]		
NSW	0.686	2.47	0.291
	[0.103]		
VIC	0.461	1.61	0.264
	[0.277]		
QLD	0.317	1.07	0.204
	[0.461]		
SA	0.185	0.58	0.088
	[0.684]		
WA	0.323	1.13	0.091
	[0.478]		
TAS	-0.014	-0.04	0.030
	[0.982]		
Constant	-2.999***		
	[0.000]		
N	6,464		
Log likelihood	-377.48		
Wald $\chi^2(34)$	223.14		

P-values in brackets. * significant at 10 per cent level, ** at 5 per cent level, and *** at 1 per cent level. Omitted groups are high pay at t-1 and high pay at t-2, female, age 55 plus, 12 or more years of education, outer region and State (other).

Table 34
Second Order Dynamic Random Effects Probit Model for Unemployment Probability (2/3 Median as Low-Pay Threshold, Discounting for the Casual Loading)

	Coefficients	*Mean Marginal Effects*	*Mean of X*
Unemployment at t-1, Unemployment at t-2	2.014***	26.39	0.011
	[0.000]		
Unemployment at t-1, Low Pay at t-2	1.873***	22.51	0.002
	[0.000]		
Unemployment at t-1, High Pay at t-2	1.115***	7.49	0.010
	[0.000]		
Low Pay at t-1, Unemployment at t-2	1.337**	10.93	0.004
	[0.001]		
High Pay at t-1, Unemployment at t-2	0.704**	3.31	0.016
	[0.014]		
Low Pay at t-1, Low Pay at t-2	0.277	0.91	0.034
	[0.291]		
Low Pay at t-1, High Pay at t-2	0.218	0.68	0.040
	[0.373]		
High Pay at t-1, Low Pay at t-2	0.147	0.44	0.051
	[0.528]		
Initial Unemployment Status	0.671***	3.02	0.036
	[0.009]		
Year 11 and below	-0.181	-0.45	0.242
	[0.816]		
Male	0.141	0.37	0.529
	[0.194]		
Age 21 to 24	-0.116	-0.28	0.027
	[0.739]		
Age 25 to 34	0.030	0.08	0.235
	[0.877]		
Age 35 to 44	-0.084	-0.22	0.334
	[0.673]		
Age 45 to 54	0.141	0.39	0.299
	[0.452]		
Married	-0.104	-0.28	0.726
	[0.730]		
Number of Dependent Children	-0.185	-0.26	0.935
	[0.273]		
Aboriginal or Torres Straits Islander	1.106***	7.37	0.012
	[0.000]		
Not Born in English Speaking Country	0.385***	1.30	0.109
	[0.008]		
Long Term Health Condition (Limits Work)	0.408	1.44	0.081
	[0.109]		
Major City	-0.680	-2.46	0.651
	[0.152]		
Inner City	-0.239	-0.59	0.231
	[0.562]		
NSW	0.709	2.50	0.291
	[0.103]		
VIC	0.497	1.71	0.264
	[0.257]		
QLD	0.318	1.03	0.204
	[0.474]		
SA	0.230	0.73	0.088
	[0.623]		
WA	0.329	1.12	0.091
	[0.482]		
TAS	0.013	0.04	0.030
	[0.983]		
Constant	-3.069***		
	[0.000]		
N	6,464		
Log likelihood	-377.98		
Wald $\chi^2(34)$	206.69		

P-values in brackets. * significant at 10 per cent level, ** at 5 per cent level, and *** at 1 per cent level. Omitted groups are high pay at t-1 and high pay at t-2, female, age 55 plus, 12 or more years of education, outer region and State (other).

Table 35
Second Order Dynamic Random Effects Probit Model for Unemployment Probability (3/4 Median as Low-Pay Threshold, Discounting for the Casual Loading)

	Coefficients	*Mean Marginal Effects*	*Mean of X*
Unemployment at t-1, Unemployment at t-2	2.012***	27.59	0.011
	[0.000]		
Unemployment at t-1, Low Pay at t-2	1.769***	20.79	0.003
	[0.000]		
Unemployment at t-1, High Pay at t-2	1.116***	7.87	0.009
	[0.000]		
Low Pay at t-1, Unemployment at t-2	0.999***	6.42	0.008
	[0.002]		
High Pay at t-1, Unemployment at t-2	0.764**	3.96	0.012
	[0.011]		
Low Pay at t-1, Low Pay at t-2	0.116	0.35	0.074
	[0.568]		
Low Pay at t-1, High Pay at t-2	0.313	1.08	0.065
	[0.112]		
High Pay at t-1, Low Pay at t-2	0.185	0.58	0.073
	[0.357]		
Initial Unemployment Status	0.652***	3.00	0.036
	[0.007]		
Year 11 and below	-0.254	-0.63	0.242
	[0.735]		
Male	0.135	0.37	0.529
	[0.198]		
Age 21 to 24	-0.159	-0.39	0.027
	[0.642]		
Age 25 to 34	0.008	0.02	0.235
	[0.965]		
Age 35 to 44	-0.078	-0.21	0.334
	[0.688]		
Age 45 to 54	0.129	0.37	0.299
	[0.478]		
Married	-0.116	-0.33	0.726
	[0.696]		
Number of Dependent Children	-0.194	-0.27	0.935
	[0.237]		
Aboriginal or Torres Straits Islander	1.086***	7.43	0.012
	[0.000]		
Not Born in English Speaking Country	0.387***	1.35	0.109
	[0.006]		
Long Term Health Condition (Limits Work)	0.377	1.34	0.081
	[0.131]		
Major City	-0.650	-2.38	0.651
	[0.161]		
Inner City	-0.196	-0.50	0.231
	[0.625]		
NSW	0.684	2.47	0.291
	[0.107]		
VIC	0.463	1.62	0.264
	[0.279]		
QLD	0.315	1.06	0.204
	[0.467]		
SA	0.206	0.66	0.088
	[0.653]		
WA	0.319	1.11	0.091
	[0.485]		
TAS	-0.028	-0.07	0.030
	[0.964]		
Constant	-2.993***		
	[0.000]		
N	6,464		
Log likelihood	-378.53		
Wald $\chi^2(34)$	218.23		

P-values in brackets. * significant at 10 per cent level, ** at 5 per cent level, and *** at 1 per cent level. Omitted groups are high pay at t-1 and high pay at t-2, female, age 55 plus, 12 or more years of education, outer region and State (other).

5.3 Low-paid Employment and Dependency on Income Support

In this section, dependency on income support is denoted by TPI, a summary income support reliance measure that expresses total income support payments as a proportion of total income as defined in section 4.4. We use TPI at the time of interview defined by _bncaupi/(_wscei +_bncaupi). TPI is then further reclassified into four categories. The four categories of TPI are: *high dependence (HD)* (TPI ≥ 0.9), *moderate dependence (MD)* (0.9 > TPI ≥ 0.5), *low dependence (LD)* (0.5 > TPI ≥ 0.1) and *no dependence (ND)* (TPI < 0.1). These TPI categories are then used as the dependent variable in a (dynamic panel) multinomial logit model with correlated random effects.

Formally, the model can be expressed as:

$$y^{*}_{jit} = \gamma_j y_{it-1} + x_{it-1}'\beta_j + \alpha_{ji} + u_{jit} \qquad \text{(model 3)}$$

$$y_{jit} = \begin{cases} 1 & \text{if } y^{*}_{jit} \geq y^{*}_{kit} \text{ for } j,k = 1,2,3,4 \\ 0 & \text{otherwise} \end{cases}$$

where j indexes the group indicating the TPI reliance level, α_{ji} are the individual random effects and x_{it} are a set of personal characteristics and other control variables. It helps to think of this model starting from a standard logit model. The first extension is to expand the number of possible outcomes from two (i.e., not dependent or dependent) to more than two (i.e., not, low, moderately or highly dependent). Next, the panel data allows inclusion of lagged outcomes of the dependent variable on the right hand side making the model 'dynamic'. Finally, one can alternatively think of the 'random effects' simply as a model with a random constant term. The inclusion of the random effects controls (imperfectly) for certain aspects of individuals that are not observed (e.g., drive, motivation, personal problems, preferences, etc.). These are collectively known as 'unobserved heterogeneity', in contrast to *observed* heterogeneity which represents all the characteristics that we do observe and control for such as age and education. In a pure mechanical sense the random effects allow for a better fit of the model to the data.

By including not only lagged values of income support on the right-hand side of the model but also indicators of low-paid employment, high-paid employment and

unemployment, the effect of past employment states on current income support reliance can be estimated.

The specification for model 3 is as close as possible to the specification used in models 1 and 2 in sections 5.1 and 5.2, but the estimation sample is different in one respect: for the analysis of income support dependency we include individuals who at any point during the first four waves of HILDA were not in the labour force. The reason is that by excluding individuals that are not in the labour force we would ignore a very significant proportion of the total population on income support.

As with models 1 and 2, model 3 is estimated using data where a discount is applied to casual wages and data where no discount has been applied. The Low Pay indicator is defined based on the two-thirds of median rule. After estimating model 3 on the two different sets of data, we found that the different definitions of the Low Pay indicator made very little difference in practice. We will hence only discuss the results from the estimation based on the data in which we apply the 20 per cent discount to casual wages and apply the two-thirds of median rule.[23]

Table 36 below displays the mean marginal effects based on the estimated coefficients from model 3 using the data in which we apply the 20 per cent discount to casual wages and apply the two-thirds of median rule.[24] The first four columns report marginal effects that are based on the estimated model 3 without random effects and the last four columns reports marginal effects that are based on the estimated model 3 with correlated random effects.

The marginal effects reported in Table 36 that we are most interested in are the ones associated with being either unemployed, in low-paid employment, or in high-paid employment in period $t-1$, holding all else constant. The base case against which the comparison is made is to be not in the labour force. In line with expectations, any paid employment in $t-1$ reduces the probability of being highly dependent on income support in period *t*. This reduced probability of being highly dependent is almost entirely offset by an increased probability of being not dependent on income support, but also has a small effect on the probability of having a low or medium dependence

[23] The full set of results based on data without applying the discount is included in the appendix.

[24] Table A.2 in the appendix contains the respective estimated coefficients of model 3 that correspond to Table 36. Table A.1 contains the equivalent of Table A.2 when using the data without applying the discount to casual wages. Table A.3 contains the marginal effects for this specification.

on income support. The marginal effects associated with being either unemployed, in low-paid employment, or in high-paid employment in period $t-1$, are approximately the same whether estimated with or without random effects. Our estimates show that a spell of low-paid employment in period $t-1$ leads to a reduced probability of being highly dependent on income support of about 6 to 7 percentage points, relative to not being in the labour force in period $t-1$ and depending on the inclusion of random effects. This contrasts with a spell of unemployment in period $t-1$ for which we predict a much smaller reduction in the probability of being highly dependent of about 3 percentage points. Furthermore, a spell of high-paid employment reduces the probability of being highly dependent on income support by an estimated 8 to 9 percentage points depending on the inclusion of random effects, not much different from the effect of a spell of low-paid employment.

A spell of low-paid employment in period $t-1$ is predicted to increase the probability of not being dependent on income support at all by about 4.5 percentage points, relative to not being in the labour force in period $t-1$ and irrespective of the inclusion of random effects. In contrast, a spell of high-paid employment in period $t-1$ is predicted to increase the probability of not being dependent on income support at all by about 6 to 7 percentage points, relative to not being in the labour force in period $t-1$ and depending on the inclusion of random effects.

Besides the effects of employment status in the previous period, two other sets of explanatory variables are shown to be important drivers of the probability of being in a particular TPI category: income support dependency when first observed (i.e., in wave 1 or at t_0) and income support dependency in period $t-1$. The marginal effects associated with being not dependent on income support in period $t-1$ and alternatively have a low, medium, or high dependence on income support in period $t-1$, holding all else constant, show that experiencing any level of income support dependence in the previous period (compared to no dependence) reduces the probability of being not dependent. The magnitude of the effect depends on whether unobserved heterogeneity is controlled for or not. When unobserved heterogeneity is not controlled for the effects are larger (between 10 to 15 percentage point reductions in the probability of being not dependent) than when unobserved heterogeneity is controlled for (between 2 to 8 percentage point reductions in the probability of being not dependent).

The effects of other personal characteristics comprise the rest of Table 36 but they are all much smaller in magnitude than the effects of the initial and previous period's income support dependency or previous period's employment status. It is important to realise that the much smaller effects of the other characteristics are conditional on controlling for the initial and previous period's income support dependency and previous period's employment status. If we did not control for these the effect of, for instance, educational attainment, would presumably be much more pronounced.

Of course, the multinomial logit specification for modelling TPI is not the only option, although it is preferred in a setting with lagged dependent variables and unobserved heterogeneity. As a cross validation, and to provide more than one approach, we have also treated TPI as a continuous variable in a standard OLS regression since the slope coefficients can be estimated consistently in that way.

Using the alternative OLS specification and treating TPI as continuous also addresses the inherent arbitrariness of the cut-offs defined for the 4 different categorical levels of TPI. The OLS results are presented in Table 37. The first column contains the specification that corresponds to Table 36 and its results will be discussed here. It uses the data that applies the discount to casual wages and includes lagged TPI. Low Pay status is based on the two-thirds of median rule. The slope estimates for Low Pay and High Pay employment in period *t-1* are -0.08 and -0.09 respectively. This is very similar to the estimated marginal effects for the Highly Dependent (HD) outcome in Table 36. As the distribution of TPI is skewed, with many not dependent or fully dependent on income support, but few in between, the OLS coefficients mimic the marginal effects estimated for the HD choice in the multinomial logit.[25]

[25] Results from a probit regression on having a positive TPI resulted in very similar estimates to the OLS regression on TPI.

Table 36
Mean Marginal Effects of Dynamic MNL on TPI
With Discount, 2/3 Median as Low-Pay Threshold

	Mean Marginal Effects							
	Without Random Effects				*With Correlated Random Effects*			
	HD	*MD*	*LD*	*ND*	*HD*	*MD*	*LD*	*ND*
High Dependence (t-1)	0.100	0.006	0.015	-0.121	0.031	0.006	0.001	-0.037
Medium Dependence (t-1)	0.092	0.027	0.025	-0.144	0.066	0.010	0.006	-0.082
Low Dependence (t-1)	0.043	0.017	0.044	-0.103	-0.002	0.009	0.015	-0.021
High Dependence (t=0)	0.053	0.004	0.012	-0.068	0.103	-0.002	0.020	-0.121
Medium Dependence (t=0)	0.051	0.012	0.025	-0.088	0.073	0.012	0.033	-0.117
Low Dependence (t=0)	0.036	0.002	0.017	-0.055	0.069	0.001	0.028	-0.098
Unemployed in (t-1)	-0.034	0.003	0.025	0.007	-0.031	0.002	0.016	0.013
Low Pay employment (t-1)	-0.069	0.003	0.023	0.044	-0.062	0.002	0.015	0.045
High Pay employment (t-1)	-0.089	-0.001	0.022	0.068	-0.077	0.000	0.015	0.062
Male	0.003	-0.004	-0.007	0.008	0.001	-0.003	-0.004	0.006
Age 21 to 24	-0.029	-0.011	-0.001	0.041	-0.027	-0.006	0.001	0.032
Age 25 to 34	-0.026	-0.004	-0.005	0.035	-0.026	-0.002	-0.003	0.031
Age 35 to 44	-0.039	-0.004	0.000	0.042	-0.039	-0.001	0.001	0.039
Age 45 to 54	-0.022	-0.004	-0.003	0.029	-0.024	-0.002	-0.002	0.028
Number of Dependent Children	0.001	0.000	0.002	-0.003	0.002	0.000	0.001	-0.003
Degree or Diploma	-0.029	-0.001	-0.001	0.031	-0.031	0.000	-0.002	0.033
Certificate	-0.011	-0.002	-0.003	0.016	-0.014	-0.002	-0.002	0.017
Year 12	-0.021	-0.001	0.005	0.017	-0.021	0.000	0.003	0.018
Married	0.035	0.004	0.022	-0.060	0.012	0.002	0.011	-0.025
Not Born in English Speaking Country	0.018	-0.004	-0.005	-0.009	0.018	-0.003	-0.003	-0.012
LT Health Condition (Limits Work)	-0.016	0.003	0.013	0.000	-0.008	0.002	0.010	-0.004
Major City	0.033	0.007	-0.014	-0.027	0.024	0.004	-0.012	-0.016
Inner City	0.005	0.005	-0.006	-0.005	0.004	0.003	-0.005	-0.002
Married – BAR	-0.065	-0.010	-0.029	0.103	-0.043	-0.006	-0.017	0.066
LT Health Condition (Limits Work) – BAR	0.080	-0.005	-0.002	-0.072	0.079	-0.005	0.001	-0.074
Major City – BAR	-0.037	-0.014	0.016	0.036	-0.027	-0.009	0.013	0.023
Inner City – BAR	0.001	-0.009	0.009	-0.001	0.001	-0.005	0.008	-0.004

Table 37
OLS on TPI (2/3 Median as Low-Pay Threshold)

	With Casual Loading Discount		*Without Casual Loading Discount*	
	TPI (t)	*TPI (t)*	*TPI (t)*	*TPI (t)*
TPI (t-1)	0.52		0.52	
	[27.51]***		[27.51]***	
TPI (t=0)	0.20		0.20	
	[11.34]***		[11.29]***	
Unemployed in (t-1)	-0.11	-0.02	-0.11	-0.02
	[6.03]***	[0.65]	[6.03]***	[0.67]
Low Pay employment (t-1)	-0.08	-0.33	-0.07	-0.32
	[7.47]***	[21.58]***	[7.22]***	[21.45]***
High Pay employment (t-1)	-0.09	-0.38	-0.09	-0.38
	[11.17]***	[32.51]***	[11.31]***	[32.80]***
Male	0.00	0.02	0.00	0.02
	[1.09]	[3.49]***	[1.17]	[3.69]***
Age 21 to 24	-0.06	-0.08	-0.06	-0.08
	[5.33]***	[4.53]***	[5.34]***	[4.55]***
Age 25 to 34	-0.05	-0.08	-0.05	-0.08
	[6.21]***	[5.72]***	[6.20]***	[5.71]***
Age 35 to 44	-0.06	-0.08	-0.06	-0.08
	[7.20]***	[5.68]***	[7.18]***	[5.65]***
Age 45 to 54	-0.04	-0.05	-0.04	-0.05
	[5.04]***	[3.77]***	[5.02]***	[3.73]***
Number of Dependent Children	0.00	0.01	0.00	0.01
	[0.20]	[3.33]***	[0.23]	[3.26]***
Degree or Diploma	-0.03	-0.08	-0.03	-0.08
	[5.86]***	[9.45]***	[5.75]***	[9.18]***
Certificate	-0.02	-0.05	-0.02	-0.05
	[2.85]***	[4.94]***	[2.81]***	[4.84]***
Year 12	-0.03	-0.07	-0.03	-0.06
	[4.28]***	[5.68]***	[4.24]***	[5.58]***
Married	-0.03	-0.13	-0.03	-0.13
	[5.92]***	[16.38]***	[5.91]***	[16.35]***
Not Born in English Speaking Country	0.01	0.02	0.01	0.01
	[2.21]**	[1.35]	[2.18]**	[1.28]
LT Health Condition (Limits Work)	0.08	0.22	0.08	0.22
	[9.89]***	[18.23]***	[9.89]***	[18.20]***
Major City	-0.01	-0.04	-0.01	-0.04
	[0.82]	[3.99]***	[0.77]	[3.86]***
Inner City	0.00	-0.02	0.00	-0.02
	[0.37]	[1.92]*	[0.39]	[1.86]*
Constant	0.18	0.62	0.18	0.62
	[14.35]***	[32.53]***	[14.32]***	[32.43]***
R-squared	0.665	0.437	0.665	0.438
Number of observations (4990 individuals)	14970	14970	14970	14970

Robust t statistics in brackets (clustered on xwaveid). Omitted groups are female, age 55 plus, less than 12 years of education, and outer regional or remote. * significant at 10%; ** significant at 5%; *** significant at 1%

6. Conclusions

The overall aim of this report was to examine in detail, using the first four waves of the HILDA Survey data, whether low-paid jobs lead to higher earning jobs and lower welfare dependency over time. Four specific key research questions were addressed in this report:

(1) How permanent a state is 'low pay'?

(2) To what extent is low-paid employment a 'bridge' to higher-paid jobs in the future? That is, how permanent or temporary are exits out of 'low pay' into 'high pay'?

(3) How much churning is there between low-paid employment and joblessness and to what extent does low-paid employment reduce or exacerbate the likelihood of experiencing unemployment in the future?

(4) How and to what extent is low-paid employment related to income support? How dependent are low-paid workers on income support? To what extent does low-paid employment interrupt dependency on income support?

In order to not allow the results of our analyses to be unduly influenced by the choice of how "low-paid" jobs are defined, four alternative definitions of low-paid jobs were used and complementary sets of results for all major analyses performed were included in the report. The low-pay definitions used are based on the four possible combinations of whether or not the casual loading is applied and whether the threshold applied is two-thirds or three-quarters of median hourly earnings. Overall, the results are not especially sensitive to the use of the alternative low-pay definitions.

Based on descriptive analyses using transition matrices of wage quartiles, it appears that low-paid workers experience a considerable amount of state persistence (**question (1)**), with between 36 and 38 per cent continuing to remain in the bottom quartile of the wage distribution by wave 4. Around 42 per cent had moved to the second earnings quartile or above by wave 4.

The magnitude of the state persistence is about 10 percentage points less when using a two-thirds of median hourly earnings definition of low pay than when using an earnings quartile based definition, but more similar when three-quarters of median

hourly earnings is used as the low-pay threshold. Around 54 per cent of employees on two-thirds median earnings in wave 1 had progressed to higher pay in wave 4 using the hourly earnings definition, while around 23 per cent were low paid in wave 4.

It is relatively easier to move out of the "low paid" category using this latter methodology than it is to move out of the "bottom quartile" in the former methodology. This can be explained by the higher concentration of low-wage workers than high-wage workers in the wage distribution. The bottom quartile of the wage distribution by definition will include individuals who have close to median earnings.

Dynamic panel models were used to re-examine the extent of low pay state persistence (**question (1)**) in a multivariate context. Results from those models imply that being in a low-paid job in the previous year significantly increases the probability (by between 3 and 6 percentage points) that an individual is in a low-paid job in the current year.

Mixed evidence exists in response to the hypothesis that low-paid employment serves as a bridge to higher-paid employment (**question (2)**). Descriptive analyses based on trajectory diagrams show that more than half of low-paid individuals in 2001 managed to break out of their low-pay state (using the two-thirds median threshold and not discounting for the casual loading) by 2002. Almost a fifth (18 per cent) of this group had moved back to low pay by 2004 while two thirds were in high paid jobs.

Further analysis of subsequent labour market status of low paid employees show that around 48 per cent "permanently" exit low pay, 11 per cent are persistently low paid, 10 per cent temporarily escape low pay, 20 per cent churn between different states and 11 per cent "permanently exit" employment.

Dynamic panel models are also utilised to examine the extent that low-paid employment reduces or exacerbates the likelihood of experiencing unemployment in the future (**question (3)**). Prior low-paid employment experiences does not increase the probability of experiencing unemployment in the future. Individuals in low-paid jobs in both $t-1$ and $t-2$ are not any more likely than individuals in high-paid jobs in both $t-1$ and $t-2$ to be unemployed at time *t*. Instead, the best predictor of whether someone is unemployed at time *t* appears to be if they were unemployed at either $t-1$ and $t-2$.

This finding, that the best predictor of being in a particular state in period *t* is to be in that same state in period $t-1$, is also found in the analysis undertaken to examine income support dependency. That is, the best predictor of being, for instance, highly dependent on income support in period *t* is to be highly dependent on income support in period $t-1$. However, this was not the main focus of the analysis. Previous income support dependency was only one of the control variables included in our analysis into how spells of low-paid employment affect income support dependency in the future (**question (4)**). We found that spells of low-paid employment reduced future income support dependence by a considerable margin, and the magnitude of this effect was not that much smaller than the effect of spells of high-paid employment. It is estimated that a spell of low-paid employment in period $t-1$, relative to not being in the labour force or experiencing a spell of unemployment, reduces the probability of being highly dependent on income support by approximately 7 percentage points. In contrast, for a spell of high-paid employment this reduction is approximately 8 percentage points.

When evaluating the effect of a low-paid or high-paid employment spell in period $t-1$ on the probability of having no income support dependency *at all* in period *t*, the following was found. The increase in the probability of having no income support dependency at all in period *t*, following a spell of low paid employment in period $t-1$, is about 4.5 percentage points. It is about 6 percentage points under a scenario of a spell of high paid employment in period $t-1$.

Finally, the robustness of our findings to alternative low-pay definitions are reassuring and imply that any discussion surrounding low-paid workers need not engage in lengthy discussions regarding the optimal way of defining low-paid workers.

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Appendix

Table A.1
Parameter Estimates of Dynamic MNL on TPI Class
Without Discount, 2/3 Median as Low-Pay Threshold

	Without Random Effects			*With Correlated Random Effects*		
	LD	*MD*	*HD*	*LD*	*MD*	*HD*
High Dependence (t-1)	1.7	2.07	2.47	0.59	1.69	1.11
	[0.00]	[0.00]	[0.00]	[0.15]	[0.00]	[0.00]
Medium Dependence (t-1)	2.63	4.65	2.7	1.73	3.37	2.46
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Low Dependence (t-1)	3.3	3.19	1.55	1.71	2.19	0.29
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.33]
High Dependence (t=0)	1.15	1.21	1.34	3.26	1.98	3.62
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Medium Dependence (t=0)	2.09	2.36	1.5	4.51	4.66	3.07
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Low Dependence (t=0)	1.34	0.85	0.97	3.69	2.27	2.68
	[0.00]	[0.05]	[0.00]	[0.00]	[0.00]	[0.00]
Unemployed in (t-1)	1.39	0.25	-0.59	1.26	0.3	-0.78
	[0.00]	[0.46]	[0.00]	[0.00]	[0.44]	[0.00]
Low Pay employment (t-1)	0.93	-0.16	-1.55	0.74	-0.3	-1.9
	[0.02]	[0.72]	[0.00]	[0.04]	[0.52]	[0.00]
High Pay employment (t-1)	0.81	-0.82	-1.88	0.52	-0.88	-2.31
	[0.01]	[0.04]	[0.00]	[0.12]	[0.04]	[0.00]
Male	-0.45	-0.55	-0.03	-0.49	-0.74	-0.08
	[0.00]	[0.01]	[0.72]	[0.00]	[0.00]	[0.42]
Age 21 to 24	-0.42	-1.59	-0.8	-0.44	-1.67	-0.98
	[0.22]	[0.02]	[0.00]	[0.28]	[0.00]	[0.00]
Age 25 to 34	-0.53	-0.8	-0.68	-0.67	-0.98	-0.94
	[0.05]	[0.02]	[0.00]	[0.02]	[0.01]	[0.00]
Age 35 to 44	-0.29	-0.89	-0.94	-0.44	-0.93	-1.29
	[0.26]	[0.00]	[0.00]	[0.13]	[0.01]	[0.00]
Age 45 to 54	-0.4	-0.7	-0.57	-0.58	-0.82	-0.83
	[0.15]	[0.02]	[0.00]	[0.04]	[0.01]	[0.00]
Number of Dependent Children	0.12	0.03	0.04	0.15	0.05	0.07
	[0.05]	[0.73]	[0.29]	[0.04]	[0.67]	[0.08]
Degree or Diploma	-0.3	-0.52	-0.7	-0.58	-0.66	-1.04
	[0.11]	[0.06]	[0.00]	[0.00]	[0.03]	[0.00]
Certificate	-0.27	-0.42	-0.31	-0.43	-0.64	-0.51
	[0.17]	[0.11]	[0.01]	[0.03]	[0.04]	[0.00]
Year 12	0.17	-0.32	-0.46	0.04	-0.29	-0.67
	[0.38]	[0.27]	[0.00]	[0.87]	[0.37]	[0.00]
Married	1.66	1.14	0.99	1.27	0.98	0.56
	[0.00]	[0.04]	[0.00]	[0.00]	[0.06]	[0.02]
Not Born in English Speaking Country	-0.26	-0.29	0.35	-0.15	-0.32	0.52
	[0.34]	[0.40]	[0.00]	[0.54]	[0.43]	[0.00]
LT Health Condition (Limits Work)	0.75	0.42	-0.25	0.89	0.59	-0.1
	[0.01]	[0.36]	[0.14]	[0.00]	[0.12]	[0.61]
Major City	-0.54	0.99	0.76	-0.72	0.9	0.7
	[0.38]	[0.21]	[0.03]	[0.22]	[0.30]	[0.08]
Inner City	-0.24	0.53	0.14	-0.35	0.46	0.11
	[0.63]	[0.36]	[0.61]	[0.49]	[0.43]	[0.73]
Married – BAR	-2.39	-2.27	-1.8	-2.36	-2.46	-1.74
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
LT Health Condition (Limits Work) – BAR	0.33	0.29	1.77	0.92	0.37	2.51
	[0.38]	[0.56]	[0.00]	[0.02]	[0.50]	[0.00]
Major City – BAR	0.56	-1.87	-0.93	0.68	-1.98	-0.89
	[0.40]	[0.03]	[0.01]	[0.30]	[0.03]	[0.03]
Inner City – BAR	0.41	-0.88	-0.02	0.66	-0.84	0.06
	[0.47]	[0.18]	[0.95]	[0.27]	[0.20]	[0.86]
Constant	-4.64	-3.07	-1.07	-5.45	-3.72	-1.38
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Corr(RE_{HD} , RE_{MD})				0.65		
Corr(RE_{HD} , RE_{LD})				0.88		
Log Likelihood	-3919.31			-3861.50		
Log Likelihood (constants only)	-9010.94			-9010.94		
Pseudo R-squared	0.57			0.57		

P-values in brackets. Omitted groups are 'no dependence' (ND) at (t-1), 'no dependence' (ND) at (t=0), Not in the labour force (NILF) in (t-1), female, age 55 plus, less than 12 years of education, and outer regional or remote. TPI class is High, Medium, Low, or No Dependence (HD, MD, LD, or ND, respectively).

Table A.2
Parameter Estimates of Dynamic MNL on TPI Class
With Discount, 2/3 Median as Low-Pay Threshold

	Without Random Effects			*With Correlated Random Effects*		
	LD	*MD*	*HD*	*LD*	*MD*	*HD*
High Dependence (t-1)	1.70	2.08	2.47	0.61	1.74	1.13
	[0.00]	[0.00]	[0.00]	[0.13]	[0.00]	[0.00]
Medium Dependence (t-1)	2.59	4.57	2.61	1.73	3.32	2.42
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Low Dependence (t-1)	3.28	3.11	1.48	1.72	2.16	0.26
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.39]
High Dependence (t=0)	1.14	1.19	1.33	3.21	1.90	3.59
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Medium Dependence (t=0)	2.08	2.36	1.49	4.45	4.59	3.01
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Low Dependence (t=0)	1.34	0.87	0.96	3.64	2.22	2.63
	[0.00]	[0.05]	[0.00]	[0.00]	[0.00]	[0.00]
Unemployed in (t-1)	1.39	0.25	-0.59	1.26	0.30	-0.78
	[0.00]	[0.46]	[0.00]	[0.00]	[0.43]	[0.00]
Low Pay employment (t-1)	1.02	-0.12	-1.41	0.76	-0.23	-1.81
	[0.01]	[0.79]	[0.00]	[0.03]	[0.61]	[0.00]
High Pay employment (t-1)	0.79	-0.86	-1.92	0.52	-0.93	-2.33
	[0.01]	[0.03]	[0.00]	[0.13]	[0.03]	[0.00]
Male	-0.45	-0.54	-0.03	-0.49	-0.73	-0.08
	[0.00]	[0.02]	[0.72]	[0.00]	[0.00]	[0.44]
Age 21 to 24	-0.43	-1.59	-0.81	-0.44	-1.68	-0.98
	[0.21]	[0.02]	[0.00]	[0.28]	[0.00]	[0.00]
Age 25 to 34	-0.53	-0.79	-0.68	-0.67	-0.97	-0.94
	[0.05]	[0.02]	[0.00]	[0.03]	[0.01]	[0.00]
Age 35 to 44	-0.29	-0.87	-0.94	-0.44	-0.92	-1.28
	[0.26]	[0.00]	[0.00]	[0.13]	[0.01]	[0.00]
Age 45 to 54	-0.40	-0.72	-0.57	-0.57	-0.82	-0.83
	[0.15]	[0.01]	[0.00]	[0.04]	[0.02]	[0.00]
Number of Dependent Children	0.12	0.02	0.04	0.15	0.04	0.07
	[0.05]	[0.80]	[0.30]	[0.04]	[0.71]	[0.09]
Degree or Diploma	-0.29	-0.49	-0.69	-0.57	-0.62	-1.03
	[0.12]	[0.07]	[0.00]	[0.00]	[0.04]	[0.00]
Certificate	-0.27	-0.42	-0.30	-0.42	-0.63	-0.51
	[0.18]	[0.11]	[0.01]	[0.04]	[0.04]	[0.00]
Year 12	0.17	-0.30	-0.45	0.04	-0.26	-0.66
	[0.37]	[0.29]	[0.00]	[0.86]	[0.42]	[0.00]
Married	1.65	1.17	0.99	1.27	1.00	0.56
	[0.00]	[0.04]	[0.00]	[0.00]	[0.05]	[0.02]
Not Born in English Speaking Country	-0.26	-0.32	0.34	-0.15	-0.35	0.51
	[0.32]	[0.36]	[0.01]	[0.52]	[0.40]	[0.00]
LT Health Condition (Limits Work)	0.75	0.40	-0.24	0.90	0.59	-0.10
	[0.01]	[0.39]	[0.14]	[0.00]	[0.13]	[0.60]
Major City	-0.54	1.00	0.76	-0.71	0.90	0.70
	[0.38]	[0.21]	[0.03]	[0.23]	[0.30]	[0.07]
Inner City	-0.24	0.54	0.14	-0.35	0.45	0.11
	[0.63]	[0.36]	[0.62]	[0.49]	[0.44]	[0.73]
Married – BAR	-2.38	-2.29	-1.79	-2.35	-2.46	-1.74
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
LT Health Condition (Limits Work) – BAR	0.32	0.33	1.76	0.91	0.36	2.50
	[0.39]	[0.52]	[0.00]	[0.02]	[0.52]	[0.00]
Major City – BAR	0.56	-1.87	-0.92	0.68	-1.97	-0.88
	[0.40]	[0.03]	[0.01]	[0.29]	[0.03]	[0.03]
Inner City – BAR	0.42	-0.89	-0.02	0.66	-0.84	0.06
	[0.46]	[0.17]	[0.95]	[0.27]	[0.20]	[0.87]
Constant	-4.64	-3.09	-1.08	-5.44	-3.72	-1.38
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Corr(RE_{HD} , RE_{MD})				0.64		
Corr(RE_{HD} , RE_{LD})				0.87		
Log Likelihood	-3916.83			-3859.55		
Log Likelihood (constants only)	-9010.94			-9010.94		
Pseudo R-squared	0.57			0.57		

P-values in brackets. Omitted groups are 'no dependence' (ND) at (t-1), 'no dependence' (ND) at (t=0), Not in the labour force (NILF) in (t-1), female, age 55 plus, less than 12 years of education, and outer regional or remote. TPI class is High, Medium, Low, or No Dependence (HD, MD, LD, or ND, respectively).

Table A.3
Mean Marginal Effects of Dynamic MNL on TPI
Without Discount, 2/3 Median as Low-Pay Threshold

	Mean Marginal Effects							
	Without Random Effects				*With Correlated Random Effects*			
	HD	*MD*	*LD*	*ND*	*HD*	*MD*	*LD*	*ND*
High Dependence (t-1)	0.100	0.006	0.015	-0.121	0.031	0.006	0.000	-0.037
Medium Dependence (t-1)	0.096	0.027	0.025	-0.148	0.067	0.010	0.006	-0.083
Low Dependence (t-1)	0.046	0.017	0.044	-0.107	-0.002	0.009	0.015	-0.022
High Dependence (t=0)	0.053	0.004	0.012	-0.068	0.103	-0.002	0.020	-0.121
Medium Dependence (t=0)	0.052	0.012	0.025	-0.089	0.074	0.012	0.033	-0.119
Low Dependence (t=0)	0.036	0.002	0.017	-0.055	0.070	0.001	0.028	-0.099
Unemployed in (t-1)	-0.034	0.003	0.025	0.007	-0.031	0.002	0.016	0.013
Low Pay employment (t-1)	-0.075	0.003	0.022	0.050	-0.064	0.002	0.015	0.047
High Pay employment (t-1)	-0.088	-0.001	0.022	0.066	-0.076	0.000	0.015	0.061
Male	0.003	-0.004	-0.007	0.008	0.001	-0.003	-0.004	0.007
Age 21 to 24	-0.029	-0.011	-0.001	0.041	-0.027	-0.006	0.001	0.032
Age 25 to 34	-0.026	-0.004	-0.005	0.035	-0.026	-0.002	-0.003	0.031
Age 35 to 44	-0.039	-0.004	0.001	0.042	-0.039	-0.001	0.001	0.039
Age 45 to 54	-0.022	-0.003	-0.003	0.029	-0.023	-0.002	-0.002	0.027
Number of Dependent Children	0.001	0.000	0.002	-0.003	0.002	0.000	0.001	-0.003
Degree or Diploma	-0.029	-0.001	-0.001	0.032	-0.031	0.000	-0.002	0.033
Certificate	-0.011	-0.002	-0.003	0.016	-0.014	-0.002	-0.002	0.018
Year 12	-0.021	-0.001	0.005	0.017	-0.021	0.000	0.003	0.018
Married	0.035	0.004	0.022	-0.060	0.012	0.002	0.011	-0.025
Not Born in English Speaking Country	0.018	-0.004	-0.005	-0.010	0.018	-0.003	-0.003	-0.012
LT Health Condition (Limits Work)	-0.016	0.004	0.013	0.000	-0.008	0.002	0.010	-0.004
Major City	0.033	0.007	-0.014	-0.027	0.024	0.004	-0.012	-0.016
Inner City	0.005	0.005	-0.005	-0.005	0.004	0.003	-0.005	-0.002
Married – BAR	-0.065	-0.010	-0.029	0.103	-0.043	-0.006	-0.017	0.066
LT Health Condition (Limits Work) – BAR	0.080	-0.005	-0.002	-0.073	0.078	-0.005	0.001	-0.074
Major City – BAR	-0.038	-0.014	0.016	0.036	-0.027	-0.009	0.013	0.023
Inner City – BAR	0.001	-0.009	0.008	-0.001	0.001	-0.005	0.008	-0.004

Appendix – Transition trees

Without discounting

Figures A.1 and A.2 are a variation of the transition matrices and illustrate the complex movements in and out of low-paid employment. The number of individuals in each box in these figures correspond to Tables 13 and 14, with the difference that the raw unweighted numbers are used in the figures whereas weighted numbers are used in the transition matrices. The decision to use unweighted data here is mainly for reasons of clarity of exposition. It thus should be borne in mind that the data presented in these figures do not adjust in any way for differences between the HILDA Survey sample and the wider population due to non-random response and attrition.

Figure A.1 focuses on persons who are low paid in wave 1 and transition into low-paid employment or unemployment in wave 2. Figure A.2 focuses on persons who are low paid in wave 1 and transition into high-paid employment or other employment in wave 2. The two figures are mutually exclusive and when combined provide a complete picture of the movements of the group of low-paid adults (n = 383) in wave 1. The figures have been split up for clarity as they would contain too many boxes if included in a single graph.

While the transition matrices are useful for depicting transitions relative to an individual's position in wave 1, they are less useful in distinguishing between the case of a group of individuals who have managed to move out of a low-paid job in wave 1 and who all remain in higher paid jobs between waves 2 and 4, and the case of different individuals moving to higher paid jobs between waves 2 and 4. For example, in Table 16, we see that of the low paid males in wave 1, 44 per cent remain low paid in wave 2 and 37 per cent remain low paid in wave 3. But it is not clear if the 37 per cent who are low paid in wave 3 were low paid in wave 2. Technically, they could have arrived in that state in wave 3 by being low paid in wave 1, not low paid in wave 2, and low paid in wave 3. By contrast, the figures provide more information regarding the trajectories of the individuals and reveal to what extent individuals can break out from a cycle of low-paid jobs to permanently obtain higher paid jobs.

Figure A.2 shows that of the 383 individuals that were in low-paid jobs in wave 1 (based on two-thirds of median hourly earnings), 200 (or 52 per cent) obtain higher paid jobs in wave 2. Around three quarters (or 148 of the 200) continue to be in high-

paid jobs in wave 3, and 57 per cent (or 113 of the 200) are in high-paid jobs in wave 4. Less than a fifth (18 per cent) of the 200 who had moved to higher pay in wave 2 had moved back to low pay in wave 4.

Figures A.3 and A.4 are similar to Figures A.1 and A.2 but use the 3/4 median low-pay threshold to define low-paid workers (n= 671). The difference in sample size (671 – 383 = 288) used in the two sets of figures are the group of individuals who have earnings between two-thirds and three-quarters of median hourly earnings. They are classified as "high paid" in Figures A.1 and A.2 but "low paid" in Figures A.3 and A.4.

Figure A.4 shows that of the 671 individuals that were in low-paid jobs (based on using three-quarters of median hourly earnings), 42 per cent (or 285 of the 671) obtain higher paid jobs in wave 2. But as seen earlier in Figure 1b, a declining percentage remain in higher paid jobs over time. Around 69 per cent (or 196 of the 285) continue to be in high-paid jobs in wave 3, and 52 per cent (147 of the 285) are in high-paid jobs in wave 4.

In Figure A.2, 113 out of the 383 people who were low paid in wave 1 (or 29.5%) found and remained in high-paid jobs in waves 2 to 4 compared to 147 out of 671 (or 21.9%) in Figure A.4 when using the alternative definition. The finding that a smaller percentage of individuals stay in high-paid jobs when the 3/4 median low-pay threshold is used to define low-paid workers is not surprising given the bar for meeting the high-paid definition is raised from two-thirds to three-quarters of median hourly earnings.

How permanent a state is low pay? Based on descriptive analyses using transition matrices, it appears that a substantial proportion of low-paid workers in wave 1 make a relatively quick transition to higher pay. Based on the two-thirds median threshold, 54.7 per cent of persons move out of the low-pay state in the 12 months to wave 2. Over the longer period of 36 months to wave 4, 53.5 per cent make the transition out of the low-pay state. Based on the two-thirds median threshold and a discount for casual loadings, similar results are found. 49.0 per cent of low-paid workers in wave 1 had made the transition to higher pay by wave 2 and 53.8 per cent had made the transition by wave 4. A substantial proportion of workers also moved from less than two-thirds of median earnings in wave 1 to three-quarter median earnings or beyond over time. In the 12 months to wave 2, 40.4 per cent of low-paid workers made such a

transition, while by wave 4, 45.7 per cent had made the transition. Men were more likely than women to make the transition from low pay to higher pay. Between waves 1 and 4, 61.4 per cent of men had made the transition as compared with 45.5 per cent of women. However, some low-paid workers experience state persistence, with 23 per cent still in the low-pay state by wave 4 when using the two-thirds median threshold.

Is low-paid employment a bridge to higher-paid jobs? Descriptive analyses based on trajectory diagrams suggest that the results are mixed. More than half of low-paid individuals in wave 1 managed to break out of their low-pay state (using the two-thirds median threshold) by wave 2 but a fifth of this group had moved back to low pay by wave 4.

Of those that manage to transition out of the low-pay state, there appears to be some persistency in staying in higher pay states. Three-quarters of those that moved from low pay in wave 1 (using the two-thirds median threshold) to high pay in wave 2 were in higher paid jobs in wave 3, and around two-thirds were in higher paid jobs in wave 4. Around 57 per cent of those that moved from low pay in wave 1 to high pay in wave 2 were in higher paid jobs in both wave 3 and wave 4.

With discounting

Figures A.5 to A.8 reproduce Figures A.1 to A.4, but use the alternative definition of low pay where the casual loading is discounted.

Figure A.1
Trajectories in Waves 1 to 4, persons who were 'Low Paid' in Wave 1
(2/3 Median Threshold)

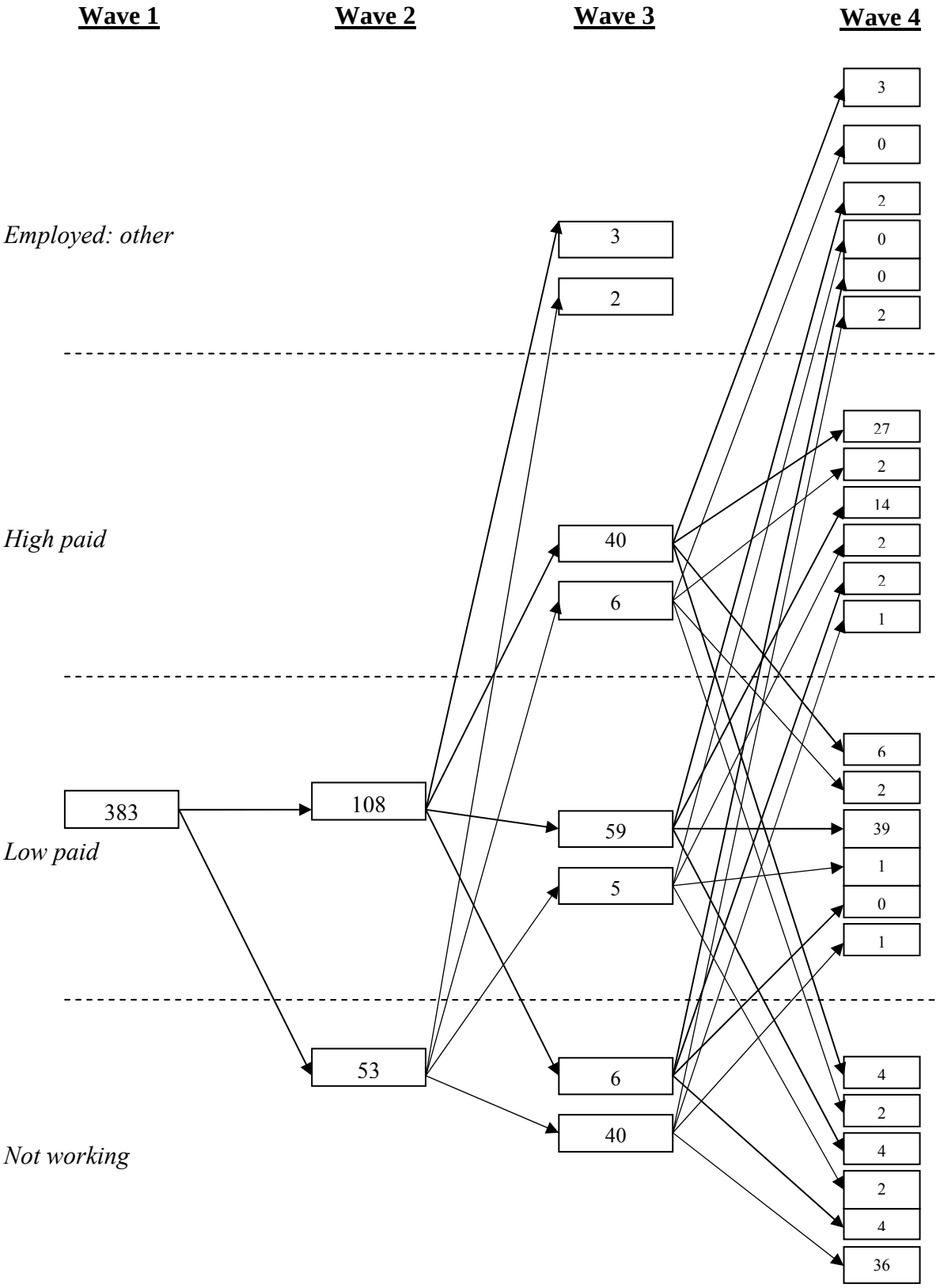

Figure A.2
Trajectories in Waves 1 to 4, persons who were 'Low Paid' in Wave 1
(2/3 Median Threshold)

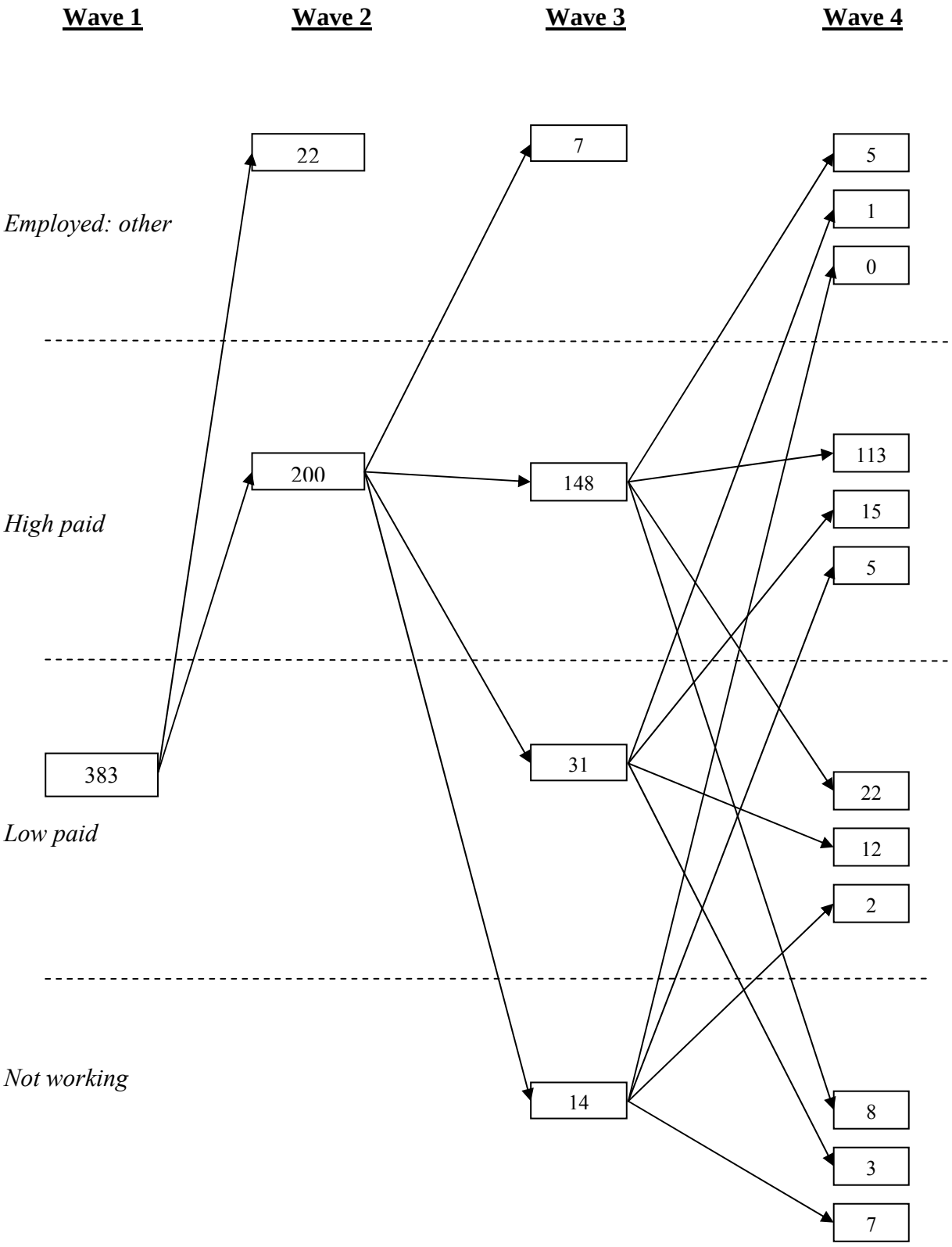

Figure A.3
Trajectories in Waves 1 to 4, persons who were 'Low Paid' in Wave 1
(3/4 Median Threshold)

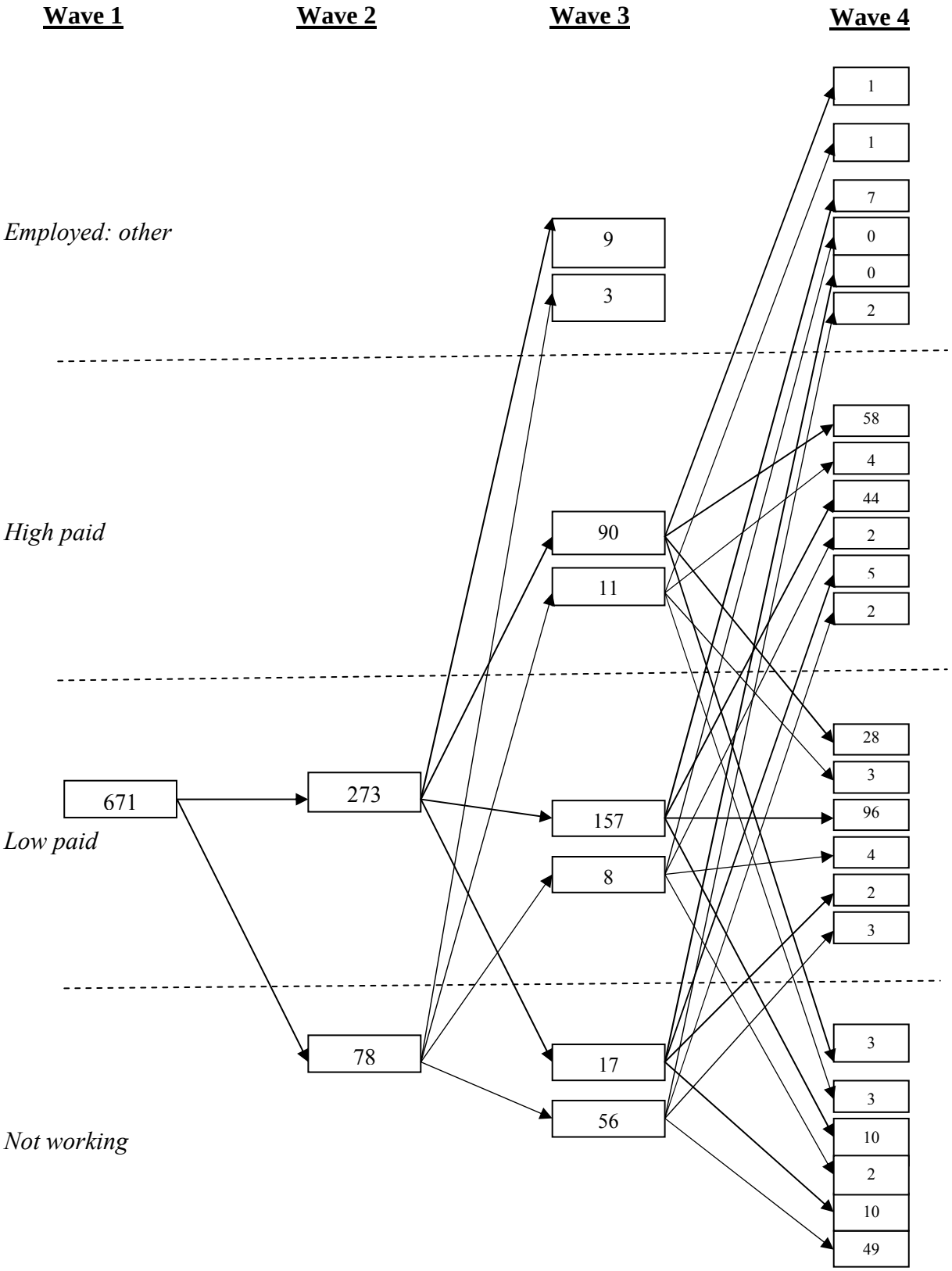

Figure A.4
Trajectories in Waves 1 to 4, persons who were 'Low Paid' in Wave 1
(3/4 Median Threshold)

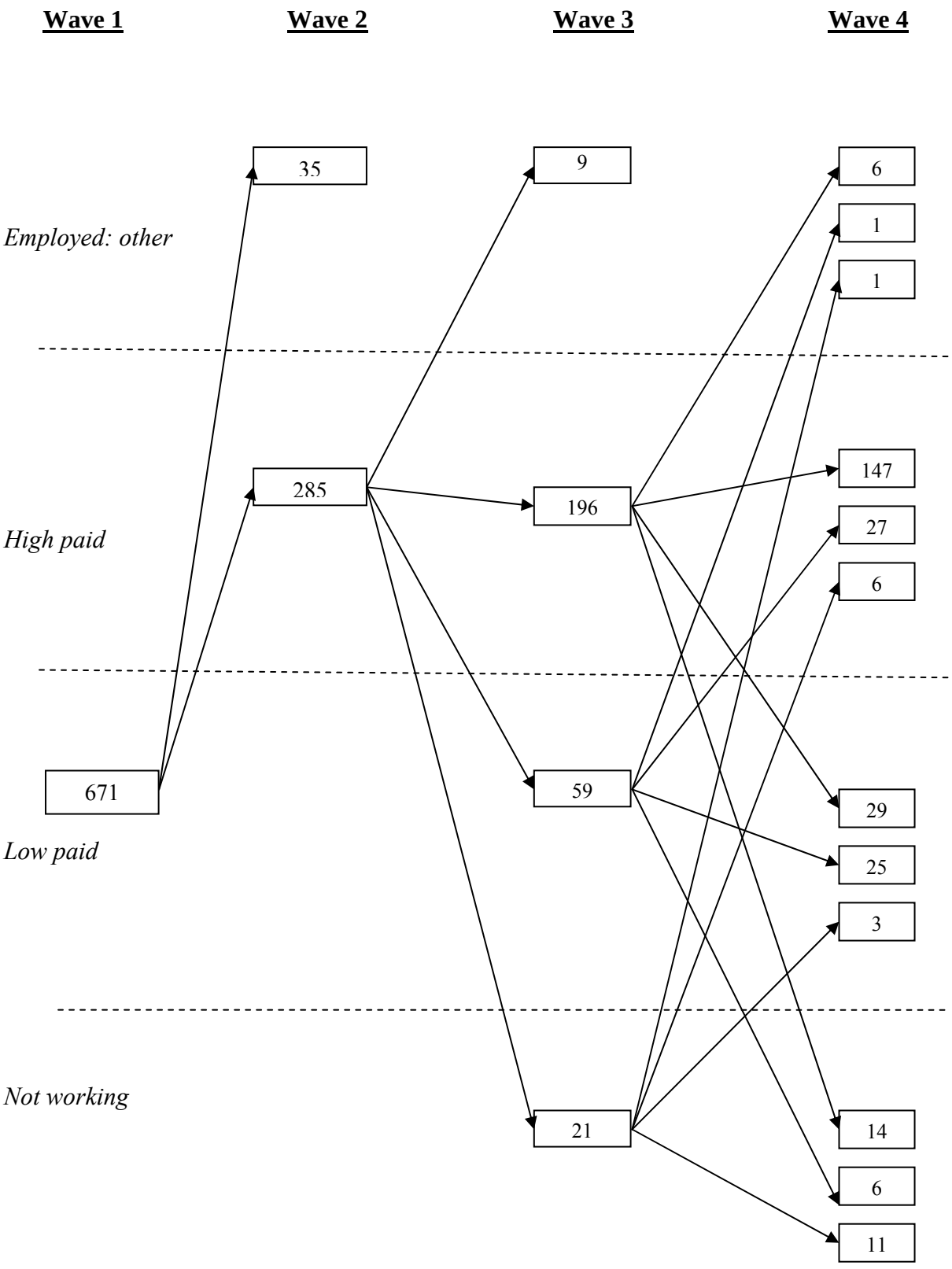

Figure A.5
Trajectories in Waves 1 to 4, persons who were 'Low Paid' in Wave 1 with Casual Discounting (2/3 Median Threshold)

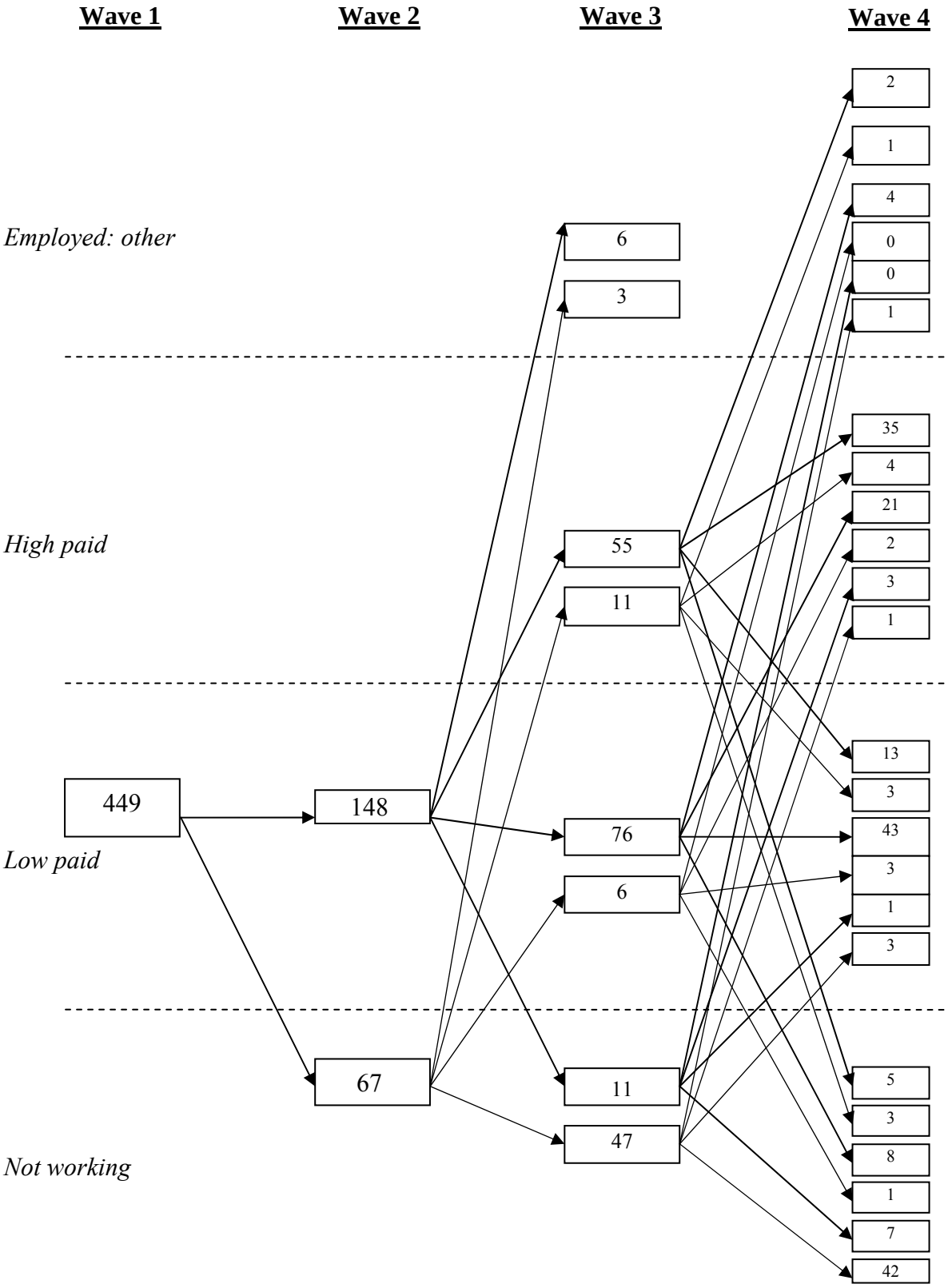

Figure A.6
Trajectories in Waves 1 to 4, persons who were 'Low Paid' in Wave 1 with Casual Discounting (2/3 Median Threshold)

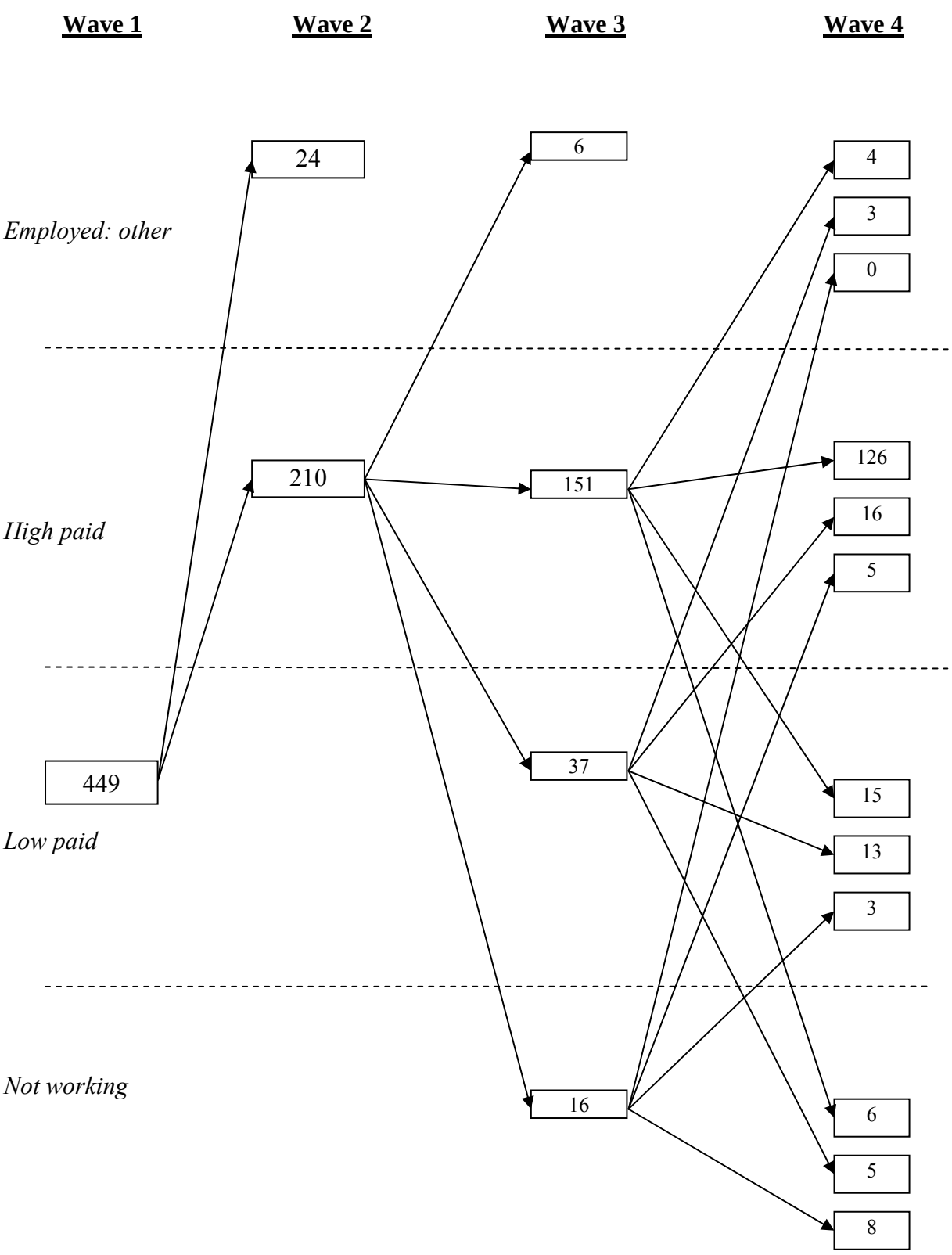

Figure A.7
Trajectories in Waves 1 to 4, persons who were 'Low Paid' in Wave 1 with Casual Discounting (3/4 Median Threshold)

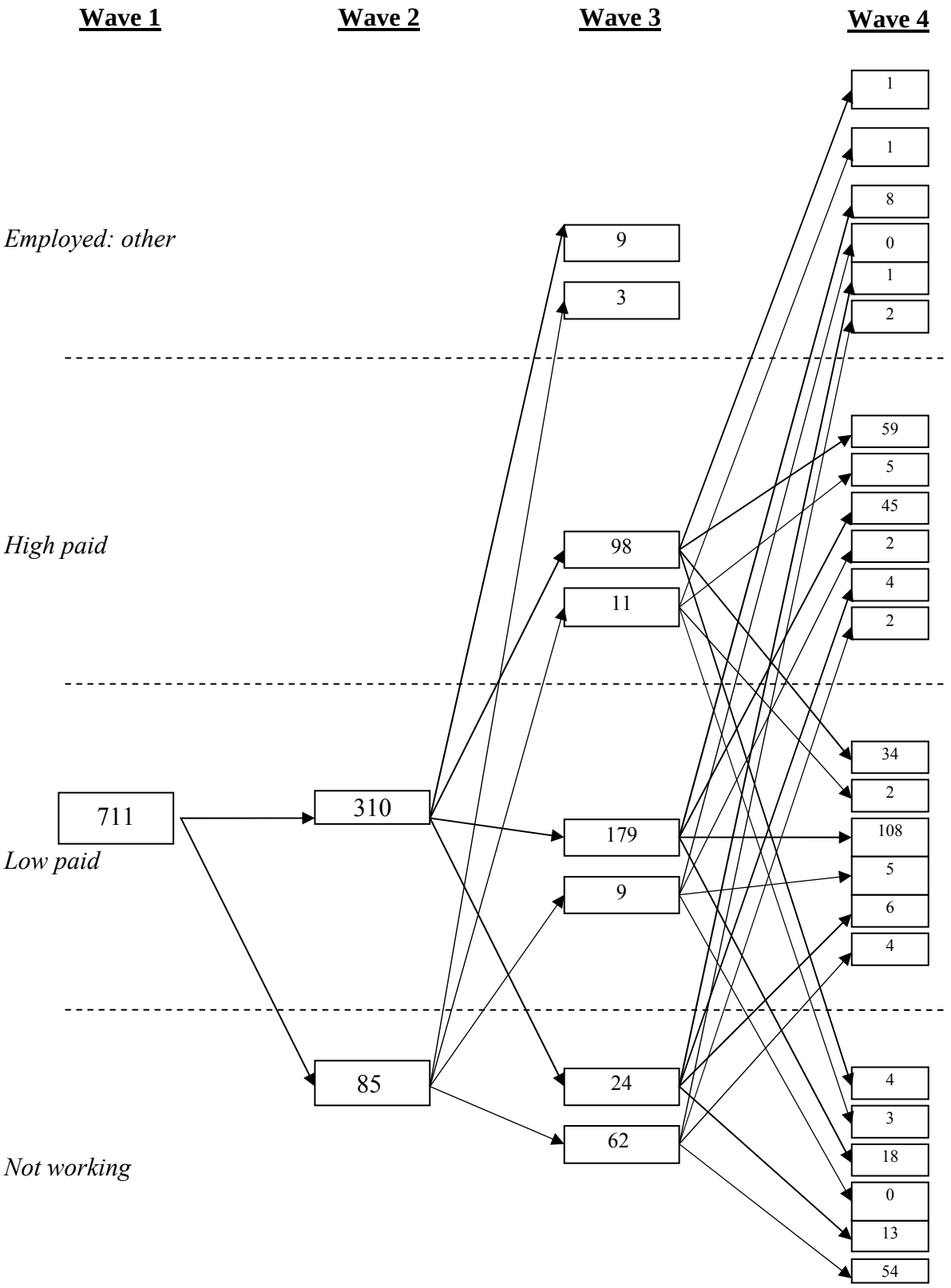

Figure A.8
Trajectories in Waves 1 to 4, persons who were 'Low Paid' in Wave 1 with Casual Discounting (3/4 Median Threshold)