Occasional Paper

Labour Market Dynamics in Australia

An Application Using the 1994–1997 Survey of Employment and Unemployment Patterns

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Annie Carino-Abello, David Pederson and Anthony King

This paper is intended to make the results of current research available to other interested parties.

Views expressed are those of the authors and do not necessarily represent those of the Australian Bureau of Statistics. When quoted or used they should be attributed clearly to the authors.

INQUIRIES

- For further information about the analysis in this occasional paper, contact Anthony King on 02 6201 2780 or 0409 604 074. For information about the Survey of Employment and Unemployment Patterns, contact Harry Kroon on 02 6252 6753.

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PREFACE

This occasional paper has been written by Annie Carino-Abello, David Pederson and Anthony King of the National Centre for Social and Economic Modelling, University of Canberra, under the auspices of the Survey of Employment and Unemployment Patterns Research Fellowship scheme. This scheme was established to facilitate high quality analysis of the survey data by researchers who have experience in the analysis of longitudinal data and an in-depth understanding of labour market issues and operations.

The paper describes labour market dynamics across the Australian population over different transition periods, and identifies differences in the pattern of flows by age, sex and other characteristics. Modelling techniques are then used to tell us how important particular characteristics are in affecting people's labour market transitions.

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SYNOPSIS

A study of labour market dynamics is important for two basic reasons. First, it elaborates our picture of the labour market, providing the framework for looking at the distribution of labour market activity in greater depth, and providing inputs to policy development. Second, it is an input into modelling labour market dynamics, an area of growing interest in Australia.

The availability of longitudinal data from the 1994–1997 Survey of Employment and Unemployment Patterns (SEUP) has afforded us with a new view of the Australian labour market. The SEUP data supplement the 'snapshot' information, provided by the common cross-sectional statistics, with longitudinal data which provide rich information on labour market dynamics. Prior to the SEUP, the picture of Australian labour market dynamics could be sketched with only very limited longitudinal data—confined to short time periods or to subgroups of the population.

This paper reports on a study which examines the general picture of labour market dynamics revealed by the SEUP data, first, to describe labour market dynamics across the Australian population and, second, to estimate regression equations which can be used to model these dynamics. The study is confined to the broad patterns across the working age population with the SEUP sample covering only the population aged 15–59 years. It does not, for example, allow an investigation of work-to-retirement issues.

The first part of the report describes labour market flows between two points in time, and identifies differences in flows by age, sex and other characteristics. In examining these transitions, we find a high degree of state dependence in the labour market states of individuals—i.e. a great percentage of respondents stay in the same labour market state over a given period of time. In the quarterly transitions, for example, depending on the initial labour market state, only between 1% and 10% of people change their labour market state. We also find that age and occupation matter a great deal—younger people make more labour market transitions, as do those in lower level occupations (i.e. intermediate and elementary clerical, sales and service workers, intermediate production and transport workers, and labourers and related workers). The foregoing confirms what we already know about the youth labour market (greater volatility), and the higher degree of mobility among lower-level occupations.

Males exhibit slightly greater stability in their labour market state relative to females. Further, the pattern of transitional probabilities for males differs from that of females in one major respect. The picture for males is dominated by full-time employment and flows to and from full-time employment. For females, part-time employment and being out of the labour market are also important states and accordingly there is a broader pattern of labour market flows among these three labour market states. In the subsequent section on modelling, the personal and work-related factors affecting the labour market transitions of males and

females are identified. To a significant extent, these differences in the labour market transitions of males and females can be seen to reflect differences in their prevailing roles in the family unit. While unmarried females exhibit a similar pattern to males, married females do not.

Transitions across industry, sector (private or public) and employment status (wage and salary earner or self-employed) occur very infrequently. On an annual basis, at least 96% of respondents who were employed remained in the same category of industry, sector or employment status, and over a three-year basis, the corresponding percentage is 89%. Transitions by occupation are made more frequently. On an annual basis 94% stayed in the same occupation, but over a three-year period the corresponding figure was only 61%. The probability of movement into a higher-skilled occupational category appeared higher for males than for females.

In the second part of the report, labour market transition probabilities were estimated. These were done separately for males and females, using a range of independent variables. Due to the short transition period over which the estimations were made and a generally high degree of labour market stability, the measured impact of each explanatory variable, all other factors constant, appears to be quite small with a very high probability of staying in the same labour market category. However, we did find that the impact of the explanatory variables varies by sex and type of transition. For females in transitions that involve no change in labour market state the effect of changing any one variable is minimal. For males, the same holds true only for the transition remaining in full-time work. For all other transitions, most of the explanatory variables (except for weekly earnings) had an important effect on the probability of moving from one labour market state to another.

The estimations reveal an intricate pattern of influences on the probabilities of transition, with age, duration, employment status, having young children, an employment handicap, marital status and occupation being the factors which have the greatest impact on the probability of moving from one labour market state to another. For both males and females, being self-employed, having increased earnings, or being in a high-skill occupation increases the probability of remaining in one's current labour market state. Generally, the effect of not having young children is to increase the probability of working (particularly full-time) for both males and females. Male and female respondents with an employment handicap are more likely to shift to looking for work or to exit from the labour market, and the effect is greater for males than for females. Older persons looking for work or not in the labour market are more likely to stay in that state than younger persons. Also increasing duration in one's current labour market state increases the likelihood of remaining in that state.

The results with respect to the other variables are quite different depending on gender and labour market state and cannot be generalised. In particular, the effect of marital status is quite different for males and females. While unmarried females are more likely to work full-time or to be looking for work, married females have a greater probability of working part-time or leaving the labour market. Conversely, unmarried males are more likely than married males to be looking for work or out of the labour market. With respect to young children, the main difference between males and females relates to part-time work. While females with young children were more likely than those with no young children to move into part-time work from full-time work or from looking for work, males with young children are less likely to remain in part-time work, or to move to part-time work, than are males having no young children.

The foregoing empirical findings enhance our knowledge of the dynamics of the labour market, and have attendant policy implications, particularly concerning gender differences in labour market transitions and the effect of factors such as age, employment status, having occupation, marital status, young children and having an employment handicap. The results of the study can also serve as an input to modelling labour market dynamics in general, and for validating current models on the dynamics of the Australian labour market.

SECTION 1   INTRODUCTION

SCOPE OF THE STUDY

This report examines labour market transitions of the Australian population aged 15–59 years using the data from the 1994–97 Survey of Employment and Unemployment Patterns (SEUP) conducted by the Australian Bureau of Statistics (ABS).

The SEUP

The SEUP is a longitudinal survey covering the period 5 September 1994 to 31 August 1997. Survey information was collected from the same individuals over three annual waves. For each wave, an interview was used to obtain information on a person's current circumstances and retrospective information on their labour market activities over the preceding 12 months—this included characteristics such as labour market activity, degree of participation (whether full-time or part-time), job-seeking activities, industry, occupation and sector.

Other sources of labour market data

Before the SEUP, analyses of Australian labour market dynamics were constrained by the availability of only very limited panel data. The regular ABS bulletins on *Labour Force Experience, Australia* (Cat. no. 6206.0) and *Labour Mobility, Australia* (Cat. no. 6209.0) do provide some useful information on dynamics, and the rotating panel used for the monthly Labour Force Survey provides the potential for up to eight months of longitudinal data. Full labour market longitudinal data has, however, only been available for certain sub-groups of the population. These include recent immigrants—covered by the *Longitudinal Study of Immigrants to Australia* (Williams, Murphy and Brooks 1997) and young people —covered by the *Longitudinal Survey of Australian Youth* and its predecessors the *Australian Youth Survey* and the *Australian Longitudinal Survey* (Miller and Volker, 1987; Kryger 1990; Gregory and Karmel 1992).

Reflecting this paucity of longitudinal labour market data, labour market flow models covering the whole population have been confined to very short time periods such as the monthly transitions revealed by the *Labour Force Surveys* (Brooks and Volker, 1984; Foster and Gregory 1984, Hughes 1992). A review of this part of the 'pre-SEUP' literature has been provided by Kapuscinski (1996). With the availability of SEUP data, the investigations and literature in this area are now expanding. Besides the analysis conducted by the ABS, the SEUP data are being used by a number of researchers. For example, recent work which is related to the topic of this report includes the use by Stromback, Dockery and Ying (1997, 1998) and Stromback and Dockery (2000) of the SEUP 'Jobseekers' sample to evaluate the effect of labour market programs and to model labour market transitions, the probability of working, and earnings.

The SEUP sample includes three subgroups. These are listed below, with their Wave 1 sample sizes in parentheses.

- Jobseekers—people who in May 1995 were either unemployed, marginally attached to the labour force, or underemployed (N=5488);

- Population Reference Group—a random sample of the population aged 15–59 years (N=2311); and

- Labour Market Program Participants—people who had commenced a subsidised employment placement or labour market training program between July 1994 and February 1995 (N=1019).

Given our concern is to investigate labour market dynamics across the whole population, we only used the Population Reference Group (PRG) subgroup of the SEUP sample.

OUTLINE OF THE STUDY

The findings from the study are presented in sections 2 and 3. Section 2 describes the extent and pattern of the labour market transitions revealed by the SEUP data. The main part of the section is concerned with the transitions of individuals between labour market states. Following this, the section also presents some material on moves between industry, occupation, sector and employment status.

Section 3 presents the results of analyses on regression equations for use in modelling labour market dynamics. While the material in section 3 was partly conditioned by the requirements of the dynamic modelling research program at the National Centre for Social and Economic Modelling, an important element in the design of the modelling exercise was that it should have general interest and value.

Before proceeding with the presentation of study findings in sections 2 and 3, it is necessary to provide some further details about the use of the SEUP data in this study. This is done in the remaining part of this section.

SAMPLE, WEIGHTS AND KEY CLASSIFICATIONS

Sample

As noted above, this study used the PRG subgroup. Attrition of this sample between Waves 1 and 2 was 8.3%, with a further 6.5% between Waves 2 and 3, amounting to an overall attrition rate of 14.2%. The first part of table 1.1 shows how attrition affects the PRG sample size. The population estimates shown in this table use the longitudinal weights which have been calculated by the ABS, these reflect both an individual case's prevalence in the population and account for attrition, with the result that the total weighted population estimate remains constant over the three waves.

1.1 SIZE OF THE SAMPLE

	Size of the sample(a)		
	Wave 1	*Wave 2*	*Wave 3*
Size of the PRG	2 311	2 120	1 983
Weighted population estimate ('000)(b)	11 050.5	11 050.5	11 050.5
Size after reducing sample	2 145	2 007	1 897
Weighted population estimate ('000)(b)	9 957.5	10 227.9	10 319.3

(a) As at 31 August 1995, 1996 and 1997.

(b) Using ABS longitudinal weights.

Clearly, the PRG sample size is not very large and it was with some reluctance that we further reduced the sample. Those respondents who were attending school or who were studying full time were excluded from the sample for the wave in which they were studying or in school. The reason for doing this followed the belief that moves from full-time education into the labour market are quite different from other moves into the labour market. With the sample size not large enough to treat students separately, it was decided to exclude students and focus on other moves into the labour market[1]. A further consideration in this exclusion was the availability of other information on the transition from education into the labour force—notably, data from the Australian Youth Survey and from the ABS *Transition from Education to Work Survey* (Cat. no. 6227.0).

The effect of the exclusion of full-time students from the sample is shown in the lower part of table 1.1, with sample numbers being reduced by between 4% and 7% for each wave. Note that after the exclusion of students, the ABS longitudinal weights no longer give a constant population total and adjusted weights were used. The use of these weights is described later in this section.

With the exclusion of full-time students, and an upper age limit on the SEUP sample of 59 years, the study does not quite cover labour dynamics across the whole population.

Adjustment of weights

The weights attached to each respondent in the SEUP sample allow the generation of population estimates. As noted above, the ABS has calculated longitudinal weights for the SEUP data which take into account the representativeness of each respondent as well as the issue of sample attrition. The way in which these weights were used in this analysis, including adjustment of the weights required by our exclusion of full-time students, is described below.

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1   One other option was to treat full-time education as a separate labour market state. However, as the sample size for this category was quite small, we did not expect to get significant results.

For analysis of data on individual waves, the ABS weights associated with each wave were used. Apart from this, two other sets of weights were used, depending on the nature of the analysis. First, the analysis used to describe transitions through all three waves required a common set of weights across the waves. For this purpose, we used the Wave 3 longitudinal weights calculated by the ABS.

Second, for the estimation of regression equations in section 3 when the data were combined across waves, the ABS longitudinal weights were adjusted to give a constant estimated population total for the PRG excluding students. After the exclusion of students, the sum of the ABS longitudinal weights increased from 9,957,500 in Wave 1 to 10,227,900 in Wave 2 to 10,319,300 in Wave 3. If these weights were used when the data were combined across waves, the Wave 1 data would be given lower overall weight than the Wave 2 data and similarly for the Wave 2 data relative to the Wave 3 data. To address this problem, the Wave 1 weights were taken as given, with the Wave 2 and Wave 3 weights then reduced by factors calculated from the estimated population totals shown in the last row of table 1.1[2]. As a consequence, the sum of the adjusted weighted population for each wave was equal to the Wave 1 figure of 9,957,500. In effect, the Wave 1 population was taken as the reference population for the purpose of combining data across waves.

Classifications of labour market state

The key characteristic in this study of labour market dynamics is a person's labour market state. This variable, which is based on the SEUP variable *labour market activities* comprises the following categories:

- full-time work;

- part-time work;

- looking for work; and

- not in the labour market.

This classification, while clearly identifying the level of employment (full-time or part-time), does not provide a complete picture of the level of labour force participation. Also, it does not, for example, distinguish between those who are looking for full-time work and those who are looking for part-time work. Clearly, such a distinction could be useful, for example, in examining moves from unemployment into employment. Accordingly, use of a more complete classification of current labour market state, which fully distinguished the level of labour force

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2   A factor of 0.973565 (9 957 525/10 227 900) was applied to the Wave 2 weights, and of 0.964943 (9 957 525/10 319 286) to the Wave 3 weights.

activity—including a distinction, for example, between whether someone was looking for full-time or part-time work—was also explored in this study. However, because of the small numbers of people in the additional categories, analysis using this classification was hampered by small sample sizes. After considerable analysis, it was found that the extended classification added little to the picture of labour market dynamics and that aspect of the work is not considered further in this report.

In operationalising the classification of labour market state, the following points should also be noted:

- The labour market state classification is based on SEUP episodes of labour market activity which are a description of a respondent's labour market experiences over the three year SEUP reference period. Labour market activity comprises the self-reported categories of working, looking for work and absence from the labour market and relies on the respondent being able to recall what they were doing over the previous 12 months.

- Because the categories used for labour market activity are not always mutually exclusive the following simple methodology was developed for deriving labour market state from labour market activity.

  - If on a given day a person's labour market activities are working (in one or more jobs) or working while looking for work then they are working. If the number of hours worked in the job(s) is less than 35 hours per week the person's labour market state is set to *part-time work*, else it is set to *full-time work*;

  - If a person's labour market activity is looking for work and they are not working, then their labour market state is also set to *looking for work*; and

  - If the person's labour market activity is absent from the labour market, then their labour market state is set to *not in the labour market*.

- As the labour market activity variable relies on a respondent's recall and perception of what they have been doing, the labour market state variable does not have the same rigour as the ABS's labour force status classification. For example, for a respondent to be given a labour force status of unemployed, it is required that the respondent be both actively looking for work and be available to start work during the week of the survey interview. The 'equivalent' labour market state of looking for work does not have these requirements and is therefore only an approximation of unemployment.

The estimated distributions of the population at Waves 1, 2 and 3 according to our classification of labour market state are given in table 1.2. These have been generated using the ABS weights specific to each wave. The slight differences across the three waves in the distributions of labour market state shown in table 1.2 should not be seen as a measure of changing macroeconomic conditions—which, incidentally, were relatively stable over the duration of the SEUP. The changing macro environment will have a small effect, but a more important factor is likely to be the ageing of the sample over the course of the survey, particularly for the more volatile youth group.

1.2 LABOUR MARKET STATES

	Males	*Females*	*Total*
	%	%	'000
September 1995			
Full-time work	80.4	38.3	5 928.7
Part-time work	7.3	27.2	1 710.7
Looking for work	7.6	5.8	670.1
Not in labour market	4.7	28.7	1 649.0
Total	100.0	100.0	9 957.5
September 1996			
Full-time work	79.8	37.8	6 038.6
Part-time work	7.2	28.6	1 819.5
Looking for work	7.3	5.6	659.7
Not in labour market	5.7	28.0	1 710.1
Total	100.0	100.0	10 227.9
September 1997			
Full-time work	79.5	35.9	5 982.1
Part-time work	7.5	30.2	1 932.8
Looking for work	6.4	5.6	618.1
Not in labour market	6.6	28.3	1 786.3
Total	100.0	100.0	10 319.3

| SECTION 2 | **LABOUR MARKET TRANSITIONS** |

In this paper the description of the extent and pattern of labour market dynamics is largely presented in terms of transition probabilities. Movements from one labour market state to another are termed labour market moves or transitions. Movements across labour market states from one period to another may then be summarised using transitional probabilities, which indicate in proportional terms how persons in a given labour market state in one period are distributed in a subsequent period.

The section begins with a presentation of the basic patterns, looking at moves between labour market state over different time periods. This is followed by an examination of moves between industry, occupation, sector and status of employment.

BASIC PATTERNS

The basic patterns of labour market transitions are examined here, beginning with a presentation of the transition probabilities for movement between the four classes of labour market state. The revealed patterns are then discussed in terms of the effect of the time period chosen, gender differences and the degree of concentration of movement within the population.

Labour market transition
probabilities

Tables 2.3 and 2.4 show the labour market transition probabilities for males and females across the four classes of labour market state and for four alternative time periods: monthly, quarterly, annual and three-yearly. Taking the example of the monthly transition probabilities, these were calculated by cross-tabulating the labour market state of respondents for each pair of successive months over the three-year period, and then averaging the transition probabilities.

As a guide to reading these tables, take the example of the first row of percentages in table 2.3. This shows that males who were in full-time work had a 98.7% chance of being in full-time work one month later, a 0.1% chance of being in part-time work, and so on. It should be stressed that these are tables of probabilities and do not directly indicate the relative size of flows. The relative size of the initial labour market (as shown in table 1.2) would need to be combined with these probabilities in order to compare the relative size of flows. Thus, for example, table 2.3 shows a higher probability of moving from part-time work into looking for work than of moving from full-time work into looking for work. However, because the total number of full-time employed males is so much greater than that of part-time employed males, the flows from full-time work into looking for work would be far greater than those from part-time work. Our primary concern here, however, is with the pattern of probabilities.

The first point to note from tables 2.3 and 2.4 is the high degree of stability in the labour market as indicated by the high probabilities in the main diagonals, particularly for the monthly and quarterly transitions. Looking for example at the figures for males in table 2.3, on average 99%, 95%, 88% and 91% of those who were working full-time, working part-time, looking for work and not in the labour market, respectively, were in the same category one month later. The corresponding probabilities for the annual transitions are lower—respectively 94%, 73%, 47% and 60%—but still the great majority of people have the same labour market state at two points one year apart.

Note that the foregoing description of labour market dynamics in terms of transition probabilities is based on a person's labour market state at the beginning and end of a period. This provides a useful picture of labour market dynamics but does not, however, provide a full picture of the extent of movement between labour market states. This is because the transition probabilities ignore any other moves within the particular period. Take the example of someone who is employed full-time at the start and end of a 12-month period, but had a 6-month spell of unemployment during the 12-month period. The annual transition approach would record no change in their labour market state over the period. With this qualification, the transition probabilities shown in tables 2.3 and 2.4 highlight the relative stability of the Australian labour market, at least in the short term. This is a factor in the third section of this report, where in modelling labour market transitions, duration in the current labour market state is an important explanatory variable in the estimations.

Note that these tables are likely to give an over-stated picture of the degree of labour market stability across the Australian population. This is because the two excluded groups—full-time students and people aged 60 years and over—would cover a large number of moves into and out of the labour market. The picture presented is thus one of movement among people who are in the course of their lifetime labour market careers. Other SEUP data, using a different sample to ours would also be expected to show a different picture. For example, Stromback, Dockery and Ying (1998a, p.3) using the Jobseekers sample found much greater mobility across labour market states—with the proportions remaining working full-time, part-time, looking for work, and absent from the labour market over the one-year period September 1994 to September 1995 being 34%, 45%, 67% and 30% respectively. Another reason for over-stating stability is that people may not report all transitions in the SEUP recall methodology.

Another point of comparison is with the estimates of monthly labour
force gross flows which are published in the ABS *Labour Force, Australia*
(Cat. no. 6203.0) and *Labour Mobility* (Cat. no. 6209.0). These gross
flows data tend to show greater flows from unemployed to all states,
particularly to out of the labour force, than the corresponding flows
revealed by the SEUP data. There are a number of reasons why the
sources should show different gross flows. Besides the difference
between the definitions of unemployment and of looking for work, the
gross flows data are derived from a larger sample covering the entire
population aged 15 years and over.

Effect of length of period

The choice of the length of period will obviously have an impact on
apparent movement in the Australian labour market—people are more
likely, for example, to change their labour market state over a three-year
period than over a monthly period. This is clearly evident in graph 2.1
and 2.2 which show the transition probabilities for having the same
labour market state at two points in time for different periods. For every
case shown in graph 2.1, the transition probability for remaining in the
same labour market state decreases as the period of analysis increases.

2.1 TRANSITION PROBABILITIES FOR MALES REMAINING IN SAME LABOUR
MARKET STATE, By Duration—Sep 1994–97
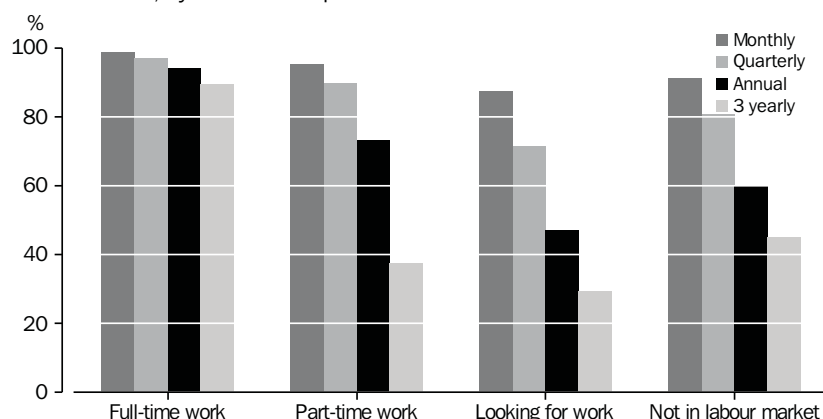
Source: Table 2.3.

2.2 TRANSITION PROBABILITIES FOR FEMALES REMAINING IN SAME LABOUR
MARKET STATE, By Duration—Sep 1994–97
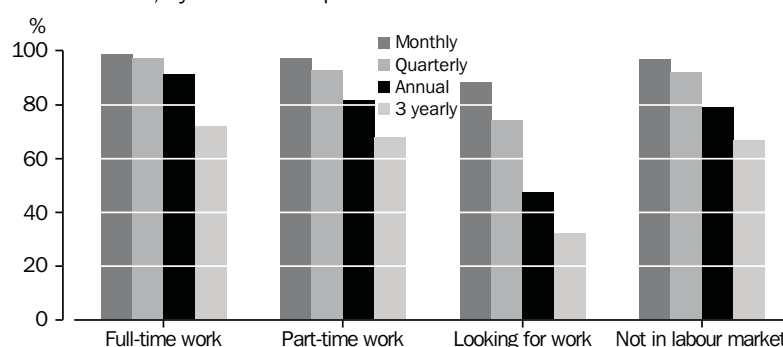
Source: Table 2.4.

This decline is most marked for males and females who were initially
looking for work, and for males who are initially working part-time or
not in the labour market. For these groups, the probabilities of no
change in labour market state are at least 85% on a monthly basis.
However, when three-yearly transitions are considered, well over half of
the people from these groups changed their labour market state. Males
therefore tend not to remain working part-time, looking for work or out
of the labour market (remembering that the sample does not cover the
main retired age groups) and females tend to move out of looking for
work. Full-time work therefore appears as the one 'stable' labour market
state for males. For females, on the other hand, full-time work, part-time
work and being out of the labour market all appear as reasonably stable
labour market states.

Transitions for males

At any point in time, about 80% of males were working full-time
(table 1.2). This large labour market state group also exhibits the highest
degree of stability, with less than two per cent of full-time working males
having a different labour market state one month later (table 2.3). For
the very small minority who did change status, the moves were mainly
into looking for work or out of the labour market, with negligible moves
from full-time to part-time work.

About 5% of males working part-time had changed their status one
month later. Most of these moves were into full-time work, with smaller
flows to looking for work and out of the labour market.

2.3   AVERAGE(a) LABOUR MARKET TRANSITION PROBABILITIES FOR MALES—SEPTEMBER 1994–97

	Labour market state at end of transition period				*Total Persons*	
	Full-time work	*Part-time work*	*Looking for work*	*Not in labour market*		
Labour market state at beginning of transition period	%	%	%	%	%	'000
Monthly						
Full-time work	98.7	0.1	0.7	0.6	100.0	4 532.6
Part-time work	2.8	95.4	1.2	0.7	100.0	424.9
Looking for work	7.8	3.4	87.5	1.3	100.0	385.3
Not in labour market	3.1	1.3	4.3	91.3	100.0	322.9
Quarterly						
Full-time work	97.2	0.3	1.6	0.9	100.0	4 192.8
Part-time work	5.6	89.9	2.3	2.3	100.0	393.1
Looking for work	19.7	6.5	71.5	2.3	100.0	356.4
Not in labour market	9.7	3.2	6.3	80.8	100.0	298.7
Annual						
Full-time work	94.1	1.7	2.6	1.6	100.0	4 152.5
Part-time work	17.0	73.2	7.3	2.4	100.0	394.2
Looking for work	32.1	9.9	47.0	11.1	100.0	334.3
Not in labour market	21.6	9.7	8.6	60.1	100.0	344.7
3 yearly						
Full-time work	89.4	4.9	3.4	2.4	100.0	4 105.7
Part-time work	51.3	37.5	5.9	5.3	100.0	378.0
Looking for work	42.0	11.2	29.4	17.5	100.0	364.0
Not in labour market	30.7	16.2	7.9	45.2	100.0	291.4

(a) Averaged for monthly, quarterly or annual transitions over the period September 1994 to September 1997.

Looking for work is the initial labour market state for males which has the least stability. On a monthly basis 12% of males who were looking for work were not looking for work one month later. Most of the transitions from looking for work were moves into full-time work, with smaller shares going into part-time work and withdrawing from the labour market. Indeed, movement from looking for work to full-time work is the only transition besides the main diagonal, which has a monthly transition probability exceeding 5%.

About 9% of males who were not in the labour market had changed their labour market state one month later. Roughly half these moves were into employment—mainly full-time work—with the remainder moving into looking for work.

Thus, while the dominant feature of the pattern of labour market moves is the high degree of stability, there are clearly other elements to the pattern. These become more apparent when the transition period is increased.

Focusing on the transition probabilities for males, what effect does increasing the transition period have on the pattern of movement? First, it can be seen that by extending the transition period to three years, transitions to full-time work have greater importance. For example 51% of persons working part-time at the start of the transition period are in full-time work three years later. For those who were initially looking for work and initially not in the labour market, the corresponding shifts to full-time work are 42% and 31% respectively.

It can also be seen that, as the transition period increased, moves out of the labour market became relatively more important for males who were initially looking for work. For example, 18% of these males made that transition over a three-year period. For males who were initially working full-time, transitions to part-time work also became more important.

In summary, the length of period over which transition probabilities are estimated makes a big difference. On a monthly and quarterly basis, the Australian labour market can be characterised as very stable and the transition probabilities for moves between labour market states tend to be quite low. Changes in labour market state on an annual or three-yearly basis, on the other hand, involve far greater proportions of the population and the relative importance of particular labour market moves will vary.

Transitions for females

Some differences between females and males in the pattern of transition probabilities have already been noted. In particular, where the male pattern was dominated by the singular stability of full-time work and by moves into full-time work, the pattern for females is more diverse. For females, the transition probabilities show similar degrees of stability for full-time work, part-time work, and being out of the labour market.

The level of stability of these three labour market states for females is, however, notably lower than that for full-time working males. The result is that there is considerably more movement between labour market states for females than for males, also the pattern of this movement for females is broader with the greater importance of periods of part-time work and being out of the labour market. This overall difference between the male and female patterns does, of course, largely reflect females' continuing primary role in child care as well as the position of many female partners as a secondary earner in a couple.

Of females working full-time, less than 5% have a different labour market state after one month and after a quarter. Over a one-year period, the figure increases to almost 10% and over a three-year period to almost 30%. As the transition period increases, part-time work emerges as the main destination of movers.

About 3% of females working part-time had changed their labour market state one month later, with about half of these moves being to out of the labour market. As the transition period increases the probability for this group of moving into full-time work overtakes moves out of the labour market, while the probabilities of transition to looking for work remain low.

2.4 AVERAGE(a) LABOUR MARKET TRANSITION PROBABILITIES FOR FEMALES—SEPTEMBER 1994–97

	Labour market state at end of transition period				Total Persons	
Labour market state at beginning of transition period	Full-time work	Part-time work	Looking for work	Not in labour market		
	%	%	%	%	%	'000
Monthly						
Full-time work	98.6	0.3	0.5	0.6	100.0	2 014.1
Part-time work	0.7	96.9	0.9	1.5	100.0	1 556.9
Looking for work	3.7	4.9	88.3	3.1	100.0	337.5
Not in labour market	0.4	1.5	1.3	96.7	100.0	1 535.1
Quarterly						
Full-time work	96.9	0.7	0.9	1.6	100.0	1 863.1
Part-time work	1.7	92.6	1.8	3.9	100.0	1 440.2
Looking for work	7.2	12.3	74.1	6.5	100.0	312.2
Not in labour market	1.3	4.3	2.4	92.0	100.0	1 420.0
Annual						
Full-time work	91.2	2.7	1.8	4.3	100.0	1 829.6
Part-time work	6.3	81.6	2.7	9.4	100.0	1 538.6
Looking for work	17.0	17.3	47.2	18.5	100.0	283.8
Not in labour market	3.9	12.0	5.1	79.0	100.0	1 442.6
3 yearly						
Full-time work	71.7	17.3	2.5	8.6	100.0	1 877.0
Part-time work	15.1	67.8	2.9	14.2	100.0	1 442.7
Looking for work	11.2	29.1	32.1	27.6	100.0	285.3
Not in labour market	7.6	18.3	7.3	66.8	100.0	1 424.4

(a) Averaged for monthly, quarterly or annual transitions over the period September 1994 to September 1997.

As with males, females who were looking for work in the initial period have the lowest probability of staying in the same labour market state over the subsequent period. Over monthly and quarterly periods, most of the female transitions from looking for work are to full-time and part-time work—particularly, the latter. Over the longer periods, moves out of the labour market assume a similar order of importance.

Among females who move from being out of the labour market, part-time work is by far the most common destination, accounting for more than a half of such moves over quarterly and longer periods. The transition probabilities for moving into full-time work are considerably lower and, indeed, are less than the probabilities of moving to looking for work except over the three-year period. This contrasts with the case for males where moves into full-time work were far more important than moves into part-time work.

The full extent of movement

As mentioned earlier, the description of labour market dynamics in terms of transition probabilities provides a useful picture of labour market dynamics but does not provide a full picture of the extent of movement between labour market states. This is because the transition probabilities ignore any other moves *within* the particular period.

The full extent of movement is now examined by shifting the analysis to a continuous basis, and recording every labour market transition made over a period. The SEUP data allow us to examine labour market state day by day. The results are shown in table 2.5

2.5   FREQUENCY OF LABOUR MARKET TRANSITIONS—SEPTEMBER 1994–97

	Monthly	*Quarterly*	*Annual*	*3 yearly*
Number of transitions during period	%	%	%	%
MALES				
None	97.5	93.4	83.8	63.8
One	2.2	5.3	8.8	8.8
Two	0.3	1.1	3.9	11.9
Three or more	0.0	0.3	3.5	15.5
Total	100.0	100.0	100.0	100.0
FEMALES				
None	97.0	91.3	78.0	51.7
One	2.6	6.4	11.7	14.7
Two	0.4	2.0	5.6	14.6
Three or more	0.0	0.3	4.7	19.0
Total	100.0	100.0	100.0	100.0

Table 2.5 displays three broad features revealed by the earlier analysis:

- the overall degree of stability;

- the decrease in stability as the time period is increased; and

- the somewhat lower degree of stability for females than for males.

The degree of stability shown by table 2.5 is, however, slightly lower than that indicated by the 'discrete' transition probabilities in tables 2.3 and 2.4. For example, while the annual transition probabilities for males in

table 2.3 amount to no change in labour market state for 87% of males, this continuous analysis shows no change over a 12-month period for 84% of males. This outcome is expected, given that all transitions within the period are now included.

Where there is no transition, or only one transition, the discrete transition probability will capture all the transitions. The extent to which discrete transition probabilities lose information on transitions can thus be assessed by looking at the proportion of the population with more than one transition during the period (graph 2.6). This proportion rises rapidly as the analysis period increases. Monthly transition probabilities will lose a negligible amount of information, with less than 1% of males and females making more than one transition over a month. Quarterly transition probabilities lose a little more information, though it is still low and quarterly transition probabilities will get it 'right' for 99% of males and 98% of females. By the time the period has increased to looking at annual transitions, however, the information loss becomes serious, particularly for females. Annual transition probabilities will not capture all labour market transitions for 7% of males and 10% of females. The proportions for a 3-year period are, of course, even higher, with transitions being missed for about a third of the population.

2.6 INCIDENCE OF MULTIPLE LABOUR MARKET
TRANSITIONS—September 1994–97

Source: Table 2.5.

The concentration of movement
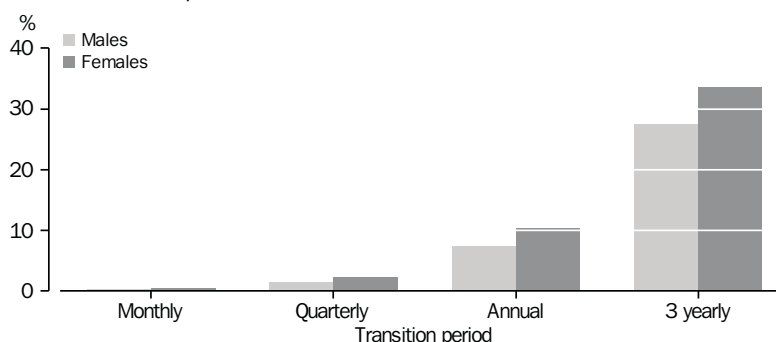
Does everyone face equal chances of changing their labour market state during a given period? Intuitively, we know that they do not and we have already seen the variation in probabilities according to sex and labour market state. Furthermore, the degree to which the probabilities of no change in labour market state diminish as the period of analysis increases indicates that movement is also concentrated within particular sex/labour market state groups. For example, table 2.3 showed a 98.7% chance of a male remaining employed full-time over a month. If this probability faced everyone in the group equally, then the chance of remaining employed

full-time over a three-year period would be about 60%. The continuous
analysis, however, showed a probability of about 75% for a full-time
employed male remaining employed full-time for three years. Identifying
how the labour market transition probabilities vary with people's
characteristics is a central element of the modelling of these probabilities
(see section 3). Here, by way of introduction to the issue, a few
dimensions of the concentration of movement are described.

The results presented in table 2.7 reinforce the earlier picture of the
relative stability—and its corollary, the relative degree of movement—of
males and females by their initial labour market state. The table is based
on the continuous analysis of transitions and shows the composition of
those making no transitions over an annual and 3-year period, in
comparison with their population shares. The comparison between shares
of the 'no transitions' group and the population shares is summarised
using a concentration ratio, which is the ratio of the former to the latter.
A ratio greater than 1.0 thus indicates an over-representation. For
example, males and females who were initially employed full-time and
females who were initially not in the labour market, have concentration
ratios greater than 1.0 and are therefore relatively stable in terms of their
labour market transitions compared to other groups. In contrast, those
who were initially looking for work, and males in part-time work, had
concentration ratios of much less than 1.0.

2.7   CONCENTRATION RATIOS—SEPTEMBER 1994–97

	Full-time work	Part-time work	Looking for work	Not in labour market	Total '000
MALES					
No transition over one year	1.1	0.7	0.5	0.6	4 486.4
No transition over three years	1.2	0.2	0.2	0.5	4 114.2
FEMALES					
No transition over one year	1.2	0.9	0.5	1.0	4 149.0
No transition over three years	1.3	0.8	0.1	1.1	3 409.8

The concentration ratio is used again in table 2.8 to examine the
propensity for labour market movement among age and occupation
groups. This time, the picture is confined to the three-year period and
the index is presented for the group with no transitions, with one or two
transitions, and with three or more transitions. The first thing this table
shows is a clear pattern in the degree of movement with age. Those in
the older age categories (aged 30 or more for males and 40 or more for
females) have a greater proportion staying in the same labour market
state. In contrast, younger males and females are over-represented among
those making three or more transitions. Second, table 2.8 shows an
inverse relationship for males between level of occupation, in terms of
skill, and the degree of labour market movement, i.e. those in

higher-skilled occupations exhibit a relatively low degree of movement. There is some suggestion of a similar pattern for female occupations, though there is a considerably smaller difference between the concentration ratios for the female occupations than for the male occupations.

2.8 CONCENTRATION RATIO(a) FOR DIFFERENT AGE AND OCCUPATION GROUPS—SEPTEMBER 1994–97

	Number of transitions over 3 year period		
	0	*1 to 2*	*3 or more*
MALES			
Age(b)			
15–19	0.43	1.45	2.82
20–24	0.45	1.64	2.46
25–29	0.94	0.87	1.39
30–39	1.08	0.87	0.86
40–49	1.08	0.89	0.83
50–59	1.07	1.04	0.62
60–62	1.06	1.31	0.36
Occupation(c)			
Managers and administrators	1.24	0.61	0.10
Professionals	1.02	1.09	0.68
Trades and advanced services	1.01	1.04	0.90
Other service	0.91	1.22	1.41
Production and transport	0.89	1.14	1.59
FEMALES			
Age(b)			
15–19	0.85	0.28	2.58
20–24	0.53	0.84	2.54
25–29	0.84	0.86	1.66
30–39	0.82	1.25	1.07
40–49	1.20	0.96	0.53
50–59	1.20	0.95	0.53
60–62	1.35	0.53	0.77
Occupation(c)			
Managers and administrators	0.74	1.67	0.50
Professionals	1.08	0.98	0.60
Trades and advanced services	1.03	1.32	0.28
Other service	0.97	0.89	1.41
Production and transport	1.06	0.74	1.15

(a) Ratio of the proportion in each transition group, to the overall proportion for that age or occupation group. Ratios greater than 1.00 indicate over-concentration.

(b) Based on age at September 1997.

(c) Based on occupation at September 1994.

In this section, we look at the movements of employed people between industries, occupations, sectors (private or public) and employment status (wage and salary earner, or self-employed)[1]. Each dimension of movement is examined in terms of:

- the number of moves made over a period, and;

- differences in the degree of movement, characterised by the length of period in the same state as in the first wave.

Industry transitions

While the SEUP includes detailed information on the industry of employment, the sample size did not support an examination of industry moves at the full level of detail available. Instead, we aggregated industries into three broad categories termed 'agriculture', 'manufacturing' and 'services'[2]. This aggregation will, of course, reduce the apparent extent of moves between industries – since moves within one of the broad industry categories will not be recognised. The definition of the three industry categories is as follows:

Agriculture;

- agriculture, forestry, fishing and hunting;

Manufacturing;

- mining;

- manufacturing;

- electricity, gas and water supply; and

- construction.

Services

- wholesale;

- retail trade;

- accommodation, cafes and restaurants;

- transport and storage;

- communication services;

---

1   For multiple-job holders, the individual was designated as working in the industry/occupation/sector/employment status of the job with the most hours worked.

2   This specific aggregation was related to the requirements of the dynamic modelling research at NATSEM.

- finance and insurance;

- property and business services;

- government administration and defence;

- education;

- health and community services;

- cultural and recreation services; and

- personal and other services.

Table 2.9 shows summary information on the number of transitions or moves made by respondents across industries over an annual and three year time interval. We take the sample of respondents who were working at the beginning of Wave 1 and at the end of Wave 3 and count any industry move within the period specified. Note that only moves across the broad industry groups were counted, and exits to looking for work and to not in the labour market within the period were not counted as an industry move. We find that moves from one industry to another are made very infrequently. On an annual basis, about 96% of these respondents stayed in the same industry. This proportion is slightly higher than the corresponding industry mobility figure of 94% from the ABS *Labour Mobility, Australia* (ABS 1998) which covered all persons working in both February 1997 and February 1998. The *Labour Mobility, Australia* figure, however, is based on moves between 17 industries and covers a different age group. Over a three-year period, the proportion of our specific SEUP sample remaining in the same industry was still high at 89%. About 10% of the sample made one or two industry moves, with a negligible proportion making three or more industry moves. Generally, males are shown to have slightly higher industry mobility than females.

2.9   CHANGES IN INDUSTRY—SEPTEMBER 1994–97

	Number of changes				Total
	0	1 or 2	3 or more		
Transition period	%	%	%	%	'000
1 year					
Males	95.3	4.7	0.0	100.0	4 246.9
Females	96.7	3.2	0.1	100.0	2 996.5
Persons	95.9	4.0	0.1	100.0	7 243.4
3 year					
Males	86.8	12.8	0.4	100.0	4 246.9
Females	91.9	7.3	0.8	100.0	2 996.5
Persons	88.9	10.5	0.6	100.0	7 243.4

In table 2.10 we compare the degree of movement experienced by workers in different industries. We take the sample of respondents who were employed at the end of Wave 1 and classify them by their reported industry of occupation at this point in time. The table shows the proportion of respondents who worked in the same industry at the end of all three waves, and the proportion who worked in the same industry at two out of the three waves (i.e. at the end of Waves 1 and 2 or at the end of Waves 1 and 3). The residual group, i.e. those whose industry at the end of Waves 2 and 3 was different from their industry at the end of Wave 1 is also shown in this table.

2.10   NUMBER OF WAVES IN THE SAME INDUSTRY(a)—SEPTEMBER 1995–97

Industry at end of Wave 1	Number of waves				Total
	3	*2*	*1*		
	%	%	%	%	'000
MALES					
Agriculture	91.6	2.0	6.4	100.0	185.9
Manufacturing	95.0	1.7	3.3	100.0	1 276.5
Services	97.3	1.8	0.9	100.0	2 501.5
Total	96.2	1.8	2.0	100.0	3 964.0
FEMALES					
Agriculture	100.0	0.0	0.0	100.0	102.6
Manufacturing	96.2	0.0	3.8	100.0	293.5
Services	98.7	0.6	0.7	100.0	2 227.7
Total	98.5	0.5	1.0	100.0	2 623.8

(a) For persons who were employed at the end of all three waves.

There is no great difference by industry in the degrees of mobility shown in table 2.10. For all three industry types, and for both males and females, over 90% of people employed at all three points in time remained in the same industry of employment. If anything, there is a suggestion of industry mobility being highest for those in agriculture (at least for males) and lowest for those in services.

Occupation transitions

As with industry, the SEUP occupation classification has been collapsed for this examination of occupational mobility. The nine SEUP categories were aggregated into five classes as follows:

Managers and administrators

Professionals

- Professionals; and
- Associate professionals.

Trades and advanced service

■ Tradespersons and related workers; and

■ Advanced clerical and service workers.

Other service

■ Intermediate clerical, sales and service workers; and

■ Elementary clerical, sales and service workers.

Production and transport

■ Intermediate production and transport workers; and

■ Labourers and related workers.

Using these five occupational classes, the pattern of occupational mobility is shown in tables 2.11 and 2.12. These tables correspond to tables 2.9 and 2.10 for industry. Looking first at the number of occupational moves (table 2.11), we see relatively little movement on an annual basis, but a considerable degree of movement over a 3-year period. About 40% of males and females changed occupations over the three-year period.

Table 2.12 shows a good deal of variation in the degree of movement according to occupation in Wave 1. Particularly notable is the high degree of occupational mobility for those males and females who were managers and administrators in Wave 1. This might appear surprising, though closer inspection of the data shows that this mobility is largely between this occupational group and the professionals group.

2.11   CHANGES IN OCCUPATION—SEPTEMBER 1994–97

	Number of changes				Total
	0	*1 or 2*	*3 or more*		
Transition period	*%*	*%*	*%*	*%*	*'000*
1 year					
Males	93.9	6.0	0.1	100.0	4 246.9
Females	93.6	6.2	0.2	100.0	2 996.5
Persons	93.8	6.1	0.1	100.0	7 243.4
3 year					
Males	57.8	40.5	1.7	100.0	4 246.9
Females	61.8	36.6	1.6	100.0	2 996.5
Persons	59.4	38.9	1.7	100.0	7 243.4

2.12 NUMBER OF WAVES IN THE SAME OCCUPATION(a)—SEPTEMBER 1995–97

	Number of waves			Total	
	3	2	1		
Occupation at end of Wave 1	%	%	%	%	'000
MALES					
Managers and administrators	41.6	30.3	28.1	100.0	354.7
Professionals	76.0	14.4	9.6	100.0	901.5
Trades and advanced service	64.1	18.4	17.5	100.0	881.5
Other service	40.2	23.3	36.4	100.0	380.1
Production and transport	71.9	9.5	18.6	100.0	816.2
Total	63.2	17.5	19.3	100.0	334.1
FEMALES					
Managers and administrators	47.2	9.8	42.9	100.0	154.1
Professionals	72.1	14.1	13.8	100.0	977.9
Trades and advanced service	75.7	11.7	12.6	100.0	408.6
Other service	83.7	8.4	7.9	100.0	1 382.9
Production and transport	80.2	11.8	8.0	100.0	327.4
Total	77.2	10.8	12.0	100.0	3 250.9

(a) For persons who were employed at the end of all three waves.

Sector transitions

Table 2.13 shows very little movement from the public sector to the private sector or vice-versa. Over a one-year period, less than 1% of workers changed their sector of employment. Similarly, table 2.14 shows very high proportions of workers remaining in the same sector over the three waves. Both tables show a slightly higher degree of sector mobility for females than for males.

2.13 CHANGES IN SECTOR—SEPTEMBER 1994–97

	Number of changes			Total	
	0	1 or 2	3 or more		
Transition period	%	%	%	%	'000
1 year					
Males	98.4	1.6	0.0	100.0	4 246.9
Females	97.4	2.6	0.0	100.0	2 996.5
Persons	98.0	2.0	0.0	100.0	7 243.4
3 year					
Males	95.4	4.5	0.1	100.0	4 246.9
Females	93.0	6.9	0.1	100.0	2 996.5
Persons	94.4	5.5	0.1	100.0	7 243.4

Sector transitions *continued*

2.14 NUMBER OF WAVES IN THE SAME SECTOR(a)—SEPTEMBER 1995–97

	Number of waves				*Total*
	3	*2*	*1*		
Sector at end of Wave 1	*%*	*%*	*%*	*%*	*'000*
MALES					
Public	94.5	5.2	0.3	100.0	707.9
Private	99.7	0.1	0.2	100.0	3 216.3
Total	98.7	1.1	0.3	100.0	3 924.2
FEMALES					
Public	93.4	1.2	5.5	100.0	512.2
Private	99.2	0.6	0.1	100.0	2 028.4
Total	97.8	0.8	1.4	100.0	2 540.6

(a) For persons who were employed at the end of all three waves.

Employment status transitions

The two categories of employment status are:

- Wage and salary earner; and

- Self-employed.

Table 2.15 shows less than 3% of workers changing their employment status over a one-year period, and less than 9% doing so over a three-year period. Mobility of employment status is higher for males than females. Over a three-year period, 11% of males changed their employment status. Table 2.16 shows that employment status mobility is also higher for those who are self-employed at the start of the period.

2.15 CHANGES IN EMPLOYMENT STATUS—SEPTEMBER 1994–97

	Number of changes				*Total*
	0	*1 or 2*	*3 or more*		
Transition period	*%*	*%*	*%*	*%*	*'000*
1 year					
Males	96.0	2.3	0.1	100.0	4 246.9
Females	98.5	0.7	0.0	100.0	2 996.5
Persons	97.1	1.7	0.1	100.0	7 243.4
3 year					
Males	89.0	10.5	0.5	100.0	4 246.9
Females	95.9	4.1	0.0	100.0	2 996.5
Persons	91.8	7.9	0.3	100.0	7 243.4

Among those transition probabilities which refer to a change of status,
the highest is the 15% probability of a self-employed male having
changed to wage and salary earner status after three years, while moves
in the opposite direction from being an wage and salary earner to
self-employment have a 7% probability. There is thus clearly some
movement for males. The picture for females (particularly wage and
salary earners) is more stable with at least 98% of wage and salary
earners and 90% of the self-employed remaining in the same employment
status after one or three years.

2.16 NUMBER OF WAVES WITH THE SAME EMPLOYMENT STATUS(a)
      —SEPTEMBER 1995–97

	Number of waves				*Total*
	3	*2*	*1*		
Employment status at end of Wave 1	*%*	*%*	*%*	*%*	*'000*
MALES					
Wage and salary earner	96.5	2.4	1.1	100.0	3 239.7
Self-employed	91.2	4.8	4.0	100.0	724.7
Total	95.4	2.9	1.7	100.0	3 964.4
FEMALES					
Wage and salary earner	99.2	0.1	0.7	100.0	2 292.6
Self-employed	97.3	0.6	2.0	100.0	331.4
Total	99.0	0.2	0.9	100.0	2 624.0

(a) For persons who were employed at the end of all three waves.

CHAPTER 3　　　　**MODELLING TRANSITIONS BETWEEN LABOUR MARKET STATES**

In the first part of this study, aspects of Australian labour market dynamics revealed by the SEUP have been described. The second part of this study involved estimating regression equations which can be used to model these dynamics. Specifically, we estimate the marginal effects of each explanatory variable on quarterly labour market transitions[1]. We specifically opted to model the transitions based on this period rather than on an annual or three-yearly basis, due to considerations about information loss. While changes are more apparent when looking at transitions over a longer period (see graphs 2.1 and 2.2), the extent to which discrete transition probabilities lose information on actual transitions increases as the period of observation is increased (see graph 2.6).

In this chapter, the model used to estimate the transition probabilities is described, this is followed by a description of the nature and selection of explanatory variables, and finally the results are presented.

THE MODEL

Several sets of transition probability estimates were generated[2]. However, we chose to focus the analysis on just one set of the estimated transition equations—namely, those for quarterly transitions between four classes of labour market state, and excluding English-speaking proficiency as an explanatory variable.

Notation　For ease of presentation, the labour market states referred to in the model use the following notation:

Class 1　full-time work
Class 2　part-time work
Class 3　looking for work
Class 4　not in the labour market

1　The marginal effects of explanatory variables in monthly transitions were also modelled and yielded similar results, although the magnitude of the effects was smaller. These results are available from the authors upon request.

2　All in all, eight sets of estimates were generated. First there were the four basic combinations of monthly and quarterly transitions for the 4-class and 6-class categorisations of labour market state. These four sets were then repeated with the omission of English-speaking proficiency as an explanatory variable. This was done because the model coefficients for English-speaking proficiency were based on quite limited data—relatively few respondents did not have good English-speaking proficiency. The 6-class categorisation of labour market state had very few observations for some groups and yielded very little additional information.

For example, a person who was in labour market state class 1 at the beginning of a three-month period will be in either the same class or move to class 2, class 3 or class 4 at the end of the period. The probability of being in each of those four states was estimated using a multinomial logit regression model. Males and females were modelled separately since there were clear differences between males and females in their labour market patterns and their transition rates. Weighted maximum likelihood estimation was used and the population weights scaled so that the total weight corresponded to the sample size for any one analysis.

Transition probabilities

The probability that an individual makes a transition from labour market state i to labour market state j is expressed as follows:

P_{ij} = P(individual makes transition from state i to state j)   (equation 1)

$$= \exp[\text{ß}_{ij}X] / \Sigma_j \exp[\text{ß}_{ij}X], \quad i,j=1 \text{ to } 4$$

where ß are the coefficients, and X the vector of personal characteristics which influence an individual's observed labour market transition. For example P_{12} = proportion of individuals who are working full-time at the start of the period and working part-time at the end of the period, whereas P_{21} = proportion of individuals who are working part-time at the start of the period and working full-time at the end of the period.

Also note that for a given value of i the probabilities sum to one, e.g. $P_{11}+P_{12}+P_{13}+P_{14}=\Sigma P_{1j}=1$.

The above model is overspecified since there is more than one solution to $ß_{11}$, $ß_{12}$, $ß_{13}$ and $ß_{14}$ that leads to the same probabilities P_{11} to P_{14}. Hence one of the $ß_{11}$, $ß_{12}$, $ß_{13}$ or $ß_{14}$ must be arbitrarily set to zero. If we set $ß_{14}$ to zero then the coefficients of $ß_{11}$, $ß_{12}$ and $ß_{13}$ would measure a relative change with respect to $ß_{14}$. The estimated coefficients are normalised over the fourth category (not in the labour market) which is designated as the base alternative r. The natural logarithm of the ratio of the probability of being in labour market state j to the base alternative r, is a linear combination of the explanatory variables:

$\log(P_{ij}/P_{ir})= ß_{ij}X$ for i=1,..,r and j=1,..,r-1   (equation 2)

where r, the base (4th) alternative, is equal to 4.

Transition probabilities
continued

The estimated ß coefficients are the marginal changes in the log of the odds of one alternative over the base alternative due to marginal changes in the independent variable. As marginal changes in the log of the odds are not intuitively understandable, marginal changes in probabilities in response to changes in the explanatory variables were computed using the following equation:

$$\partial P_{ij}/\partial X = P_{ij}(ß_{ij} - \Sigma_j P_{ij}ß_{ij}), \ i,j = 1..4 \hspace{3cm} \text{(equation 3)}$$

The estimation dataset

The estimation data was created by combining the data on transitions over the three-year period covered by the SEUP. This was done by combining data from separate quarterly transition intervals. For example, data for the first interval contained labour market state and other characteristics of each person on 5 September and 5 December 1994, data for the second interval was based on characteristics at 5 December 1994 and 5 March 1995 etc. Each person in the survey was thus represented up to twelve times in the combined sample. This dataset was used to produce the statistics for the three-month transitions presented in tables 2.3 and 2.4.

EXPLANATORY VARIABLES

An initial set of possible explanatory variables was identified, and their association with labour market state and transition probabilities was investigated. A brief description of these variables is given in table 3.1.

Evaluation of explanatory variables

Data for the first nine explanatory variables was available from the SEUP for each day of the SEUP reference period, and was therefore able to be evaluated at the beginning and end of each quarterly interval. For the remaining five variables, however, information was only collected once each year. For all explanatory variables, if a person was classified as 'not known' or as 'not applicable or not known' for a particular variable then the value for that variable was assumed to be missing.

3.1   LIST OF VARIABLES USED

	Description
Dependent variable	
Labour market state at end of the period	Categorical variable indicating the labour market status of the respondent at the end of the period, namely: full-time work/part-time work/looking for work/not in labour market
Explanatory variables	
Age and its square (years)	A continuous variable, rounded to the nearest year
Duration	A continuous variable measuring number of completed quarters in the current labour market state
Weekly earnings	A continuous variable measuring weekly earnings (in September quarter, 1994 dollars) of employed persons, in the job for which the number of hours worked per week was the greatest, calculated as weekly earnings divided by the number of hours worked per week
Hourly earnings(a)	A continuous variable measuring hourly earnings (in September quarter, 1994 dollars) of employed persons, in the job for which the number of hours worked per week was the greatest
Industry	Categorical variable indicating the industry of each employed respondent or the industry of each non-employed respondent(c) in their last period of full-time employment (if any) in the previous two years, namely: agriculture/manufacturing/services/not applicable or not known
Occupation(b)	Categorical variable indicating the occupation of each employed respondent or the occupation of each non-employed respondent(c) in their last period of full-time employment (if any) in the previous two years, namely: manager or administrator/professional or associate professional/trade or advanced service/other service/production, transport or labouring/not applicable or not known
Employment status	Categorical variable indicating the status of each employed respondent, namely: wage and salary-earner/self-employed/not applicable or not known (Benchmark group: wage and salary earner)
Sector(a)	Categorical variable indicating the sector of employment of each employed respondent, namely: public sector/ private sector/ not applicable or not known
Time of year(a)	Categorical variable indicating the time of the year, namely: December, January or February/March or April/May, June, July, August, September, October or November
Young children	Categorical variable indicating whether the respondent: has at least one child aged 0 to 4 years/does not have any children aged 0 to 4 years/not known (Benchmark group: has young children)
Educational attainment(a)	Categorical variable indicating whether the respondent: has gained post-school qualifications/has reached the highest level of secondary school/has not reached the highest level of secondary school/not known
Englishing speaking proficiency	Categorical variable indicating whether the respondent: speaks good English/speaks English fairly well, not well or not at all/not known (Benchmark group: speaks good English)
Employment handicap	Categorical variable indicating whether the respondent: has no condition which is a handicap to employment/not known (Benchmark group: has no employment handicap)
Marital status	Whether the respondent: is married or is in a de facto relationship/is not married and is not in a de facto relationship/not known (Benchmark group: is married or in a de facto relationship)

(a) Not included as an explanatory variable in the final model due to lack of statistical association between the variable and transition probabilities (refer to Appendix A for details).

(b) Included as an explanatory variable, but redefined to include only two categories (see succeeding section on selection of explanatory variables and Appendix A).

(c) For those respondents who were not employed, these variables (occupation and industry) thus provided measures of their previous employment (if any). Further characteristics of previous employment could have been included, such as earnings, though this would have been complicated by the need to adjust for inflation.

Continuous variables

Four of the explanatory variables—age, duration, weekly earnings and hourly earnings—are continuous. The mean values of these variables for each labour market class, and by sex, are shown in table 3.2.

3.2   MEAN VALUES OF CONTINUOUS EXPLANATORY VARIABLES—
       SEPTEMBER 1994–97(a)

			Labour market state	
Variable	Full-time work	Part-time work	Looking for work	Not in labour market
	MALES			
Age (years)	38.1	37.9	34.9	43.9
Duration (quarters)	30.8	17.5	4.8	13.3
Weekly earnings ($)	656.2	271.2	. .	. .
Hourly earnings ($)	14.5	13.7	. .	. .
	FEMALES			
Age (years)	36.0	39.1	33.3	41.7
Duration (quarters)	22.3	19.8	4.2	20.5
Weekly earnings ($)	536.7	236.1	. .	. .
Hourly earnings ($)	13.1	14.8	. .	. .

(a) Average of mean values based on quarterly data over the period.

For some persons the value for 'duration' was very high and those extreme values exerted too great an influence on the analyses. On the basis of an inspection of the distribution of the values for this variable, the influence of extreme values was reduced by constraining duration to a maximum value of 80 quarters for transitions from classes 1, 2 and 4, and to a maximum value of 20 quarters for transitions from class 3.

Categorical variables

The other explanatory variables are categorical. A weighted cross-tabulation was used to produce the distribution of respondents for each categorical explanatory variable, by sex and labour market state, as shown in table 3.3.

3.3 DISTRIBUTION OF RESPONDENTS ACROSS CATEGORIES OF EACH DISCRETE EXPLANATORY VARIABLE—
SEPTEMBER 1994–97(a)

							Labour market state	
	Full-time work		Part-time work		Looking for work		Not in labour market	
Variable	Female	Male	Female	Male	Female	Male	Female	Male
	%	%	%	%	%	%	%	%
Industry								
Agriculture	2.6	4.4	6.2	3.7	2.7	1.7	4.6	2.6
Manufacturing	15.3	34.6	10.1	23.7	20.5	46.5	15.2	28.5
Services	82.1	61.0	83.7	72.6	76.9	51.8	80.2	68.9
Occupation								
Managers and administrators	5.4	10.6	2.9	3.0	3.8	0.3	1.1	3.3
Professional	37.9	30.5	18.7	16.7	7.2	9.8	35.7	22.0
Trade, advanced service	13.2	24.8	13.9	17.0	19.0	23.0	13.2	21.5
Other service	33.1	11.0	48.8	25.9	40.5	22.1	36.6	21.0
Production and transport	10.4	23.0	15.6	37.4	29.6	44.8	13.3	32.3
Employment status								
Wage and salary earner	90.3	80.9	85.0	74.3	. .	. .	. .	. .
Self-employed	9.7	19.1	15.0	25.7	. .	. .	. .	. .
Sector								
Private	23.9	18.7	17.7	11.8	. .	. .	. .	. .
Public	76.1	81.3	82.3	88.2	. .	. .	. .	. .
Time of year								
December to February	16.7	16.6	16.4	15.7	17.7	17.6	16.6	17.5
March to April	16.6	16.8	16.7	16.9	18.0	15.4	16.4	15.9
May to November	66.7	66.6	66.9	67.3	64.3	66.9	66.9	66.6
Young children								
Yes	9.9	17.0	22.7	8.2	24.8	15.1	34.0	6.8
No	90.1	83.0	77.3	91.8	75.2	84.9	66.0	93.2
Educational attainment								
Post-school qualification	52.4	60.9	43.3	42.6	31.0	31.3	30.6	39.3
Year 12	15.8	14.5	13.0	15.2	19.0	19.5	15.9	12.1
Less than year 12	31.8	24.6	43.7	42.2	50.0	49.2	53.5	48.6
English-speaking proficiency								
Good or fairly well	98.3	97.3	97.3	94.2	90.3	92.2	91.8	95.1
Not well or not at all	1.7	2.7	2.7	5.8	9.7	7.8	8.2	4.9
Employment handicap								
Yes	9.1	10.8	10.0	20.4	20.5	34.3	39.5	63.4
No	90.9	89.2	89.9	79.6	79.5	65.7	70.5	36.5
Marital status								
Married or de facto	58.5	69.6	75.9	53.0	48.3	41.7	77.8	49.6
Not married	41.5	30.4	24.1	47.0	51.7	58.3	22.2	50.4
	no.	no.	no.	no.	no.	no.	no.	no.
Sample size	416	820	476	156	197	239	472	142

(a) Average distribution based on quarterly data over the period.

Selection of explanatory
variables

Chi-square tests were performed to determine which variables had a significant association with labour market state and transition probabilities. The variables to be used as explanatory variables were chosen on the basis of the results of these chi-square tests. Note also that following the initial tests, the occupation variable was collapsed into two (instead of five) categories, with managers and professional/associate professionals in one group, and the remainder in the second group (see Appendix A for details regarding selection process and simplification of the occupation variable).

The same set of variables was to be used in all analyses and so a variable was chosen if it produced one or more significant chi-squares. A 'significant' chi-square was defined as one for which the p-value was less than or equal to 0.1[3]. The relatively high critical p-values mean that the selection procedure was conservative, so that it was unlikely that any potentially useful variables were excluded from the final set.

The variables which were chosen from the analyses for a three month transition period were: age and age squared, duration, weekly earnings, hourly earnings, occupation (class 2), young children, English-speaking proficiency, employment handicap and marital status.

Note that occupation was only included in analyses for persons who were working, either full time or part-time, at the commencement of a transition period. In addition to these variables, the variable employment status was also added since weekly earnings was not available for persons whose employment status was self-employed. The variables thereby included were employment status, as a categorical variable, and the interaction of employment status and the continuous variable weekly earnings. As these variables related to periods of employment they were therefore only included in analyses for persons that were working, either full time or part time.

ASSESSING THE MODEL

To assess the model, the model's goodness of fit and predictive success were to be investigated.

Goodness of fit

The model's goodness of fit was determined by an analogous measure to the conventional R^2 in standard regressions, computed as the proportion of the null model chi-square accounted for by all of the explanatory variables. This ranged from 0.071 to 0.242 with an average of 0.136.

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3   For monthly transitions the chi-squares were generally lower. Therefore for these transitions a significant chi-square was defined as one with a p-value of 0.25 or less.

Goodness of fit *continued*

Three explanatory variables that were found to make a significant contribution to the model chi-square were age, age squared and duration. Their contributions to chi-square when alone in the model ranged from 32% to 82% in the three-month transitions (see Appendix table A.4 for details on degree of significance of other explanatory variables).

Predictive success

The predictive success of the regressions was also estimated. As an example, consider transitions of females working full-time. The estimating equations may be used to produce estimates of the probabilities of remaining in full-time work and of the transitions to part-time work, looking for work and not in labour market for each female in the sample. Weighted averages of those estimated probabilities should agree closely with the observed transition probabilities if the estimation procedure has proceeded satisfactorily. A comparison of observed and predicted probabilities for the overall sample (as well as disaggregated by the presence or otherwise of young children—as one example of a cross-classification) showed that discrepancies between the observed and predicted probabilities were minimal, never exceeding 0.01 percentage point.

The above example of predictive success was based on a relatively large sample size, as, on average, 37% of females were in full-time work at any time. We thus took as a second example transitions for females looking for work. This group represents about 6% of the sample at any time. The discrepancies between the observed and predicted probabilities for this group were larger than in the first example, but were still acceptably low—never exceeding 1 percentage point.

INTERPRETING THE RESULTS

In modelling transition probabilities there were four analyses for males and four analyses for females, i.e. one for each labour market state at the start of the transition interval. The marginal effects of the explanatory variables based on equation 3 are presented in tables 3.6 to 3.9. These correspond to the parameter estimates from standard regressions, and give, in percentage point terms, the expected change in the transition probability given a unit change in the explanatory variable[4]. The transitional probabilities used to estimate the marginal effects are shown at the foot of the table, also in percentage point terms. These transitional probabilities may be likened to the constant term in standard regression results as they give the average probability for being in each labour

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4   This is true for all explanatory variables except for age; as age was entered in the model with linear and quadratic terms, we need to take some extra steps to calculate and present its per-unit effect on the base probability.

market state for the base group. Note that the fitted equations used to estimate the above marginal effects may also be used to estimate transition probabilities using the procedure outlined in Appendix B.

For all analyses, the base or omitted group in the regressions refers to an individual who is a wage and salary earner, speaks good English, has young children, has no employment handicap, is married or in a de facto relationship, has a high-skill occupation (manager, administrator, professional or associate-professional), and has zero values for all continuous variables[5].

Note that the effect of each variable depends on two things: the magnitude of the marginal effect and the value of the base probability. It is noticeable that the base probability is highest for the labour market state that one started out from, e.g. in table 3.4 the base probability is highest for those working full-time (96.9% for females and 97.2% for males). In general, the probability of not changing labour market state is quite large, so the effect of changing any one variable (unless the partial effect is very large) would be minimal. In contrast, the transition probabilities involving shifts from one labour market state to another are small, so the contributory effect of changing the value of even one variable would likely be relatively large. In all cases, the discussion of the effect of changing the value of an explanatory variable includes the assumption that the values of all other explanatory variables are held constant. The net impact of categorical variables is easily estimated by adding the estimated marginal effect to the base probability. For the continuous variables (age, duration and weekly earnings) measuring the impact is less straightforward as one needs to take into account the unit of measurement, and to multiply the average value for that variable by the marginal effect (mean values for continuous and categorical values were presented in tables 3.2 and 3.3).

In the case of age, there is the added complication that, since age has been included in the model with both linear and quadratic terms, the effect of age on the transition probability need not be constant, but can vary across different age values[6]. The results are thus better presented graphically based on another indicator that we refer to as 'net marginal effect'. Given particular values for age, the net marginal effect is calculated as:

= age*(coefficient on age) + age-squared*(coefficient on age-squared)

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5 An alternative approach would have been to use the mid value for the continuous variables as the omitted group, however we opted to follow the conventional approach.

6 Given that age is a major effect, in future work it would be interesting to explore alternative specifications for age (e.g. spline effect) that may describe more accurately the changing effect of age over time.

The net marginal effect of age for females from selected labour market states is presented in graphs 3.4 and 3.5. The main thing to note from the graphs is the sign and magnitude of the net marginal effect, and whether the net marginal effect increases or decreases with increasing years of age.

RESULTS FOR FEMALES

The effect of each explanatory variable on the labour market states of females is discussed in this section.

Age

The effect of age varies substantially depending on the particular labour market transition. Nevertheless one general finding is that the net marginal effect of age on the probability of staying in the same labour market state is always positive. Thus, between the ages 20–60, the longer one is in a particular labour market state, the more likely one is to continue in that state. For example, graph 3.4 shows that for females in full-time work, taking values for age over the range of 20–60 years increases the probability of remaining in full-time work over the base case (where age is set at zero). The effect remains roughly constant at about 6 to 7 percentage points across the age range, in a given quarter.

For all females originating from full-time work, the effect of age is roughly constant across different ages. Specifically, the net marginal effect is close to zero for transitions to part-time work, it ranges from –2 to –3 percentage points for transitions to looking for work, and from –4 to –5 percentage points for transitions out of the labour market, in a given quarter.

While the effect of age varies only slightly across the age range for females originating from full-time and part-time work, it is more varied for females originating from other labour market states. The effect of age for females making transitions from looking for work is particularly large. Graph 3.5 shows that for females in this group the probability of remaining in the same labour market state is positive and increasing over the age range from 8 percentage points at age 20 to 30 percentage points at age 60; the probability of shifting to full-time and part-time work decreases with age and the probability of withdrawing from the labour market decreases till age 40 then rises thereafter. Results on females originally not in the labour market indicate that the net effect of age on the probability of remaining in this state is positive and increases with age, but decreases with age for all other labour market destinations.
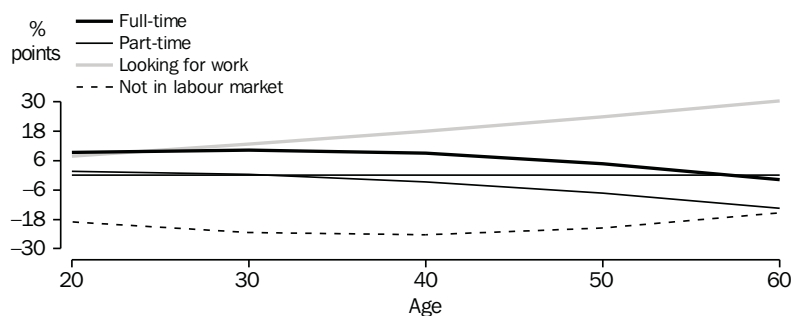
3.4 NET MARGINAL EFFECT OF AGE FOR FEMALES ORIGINATING FROM FULL-TIME WORK(a)
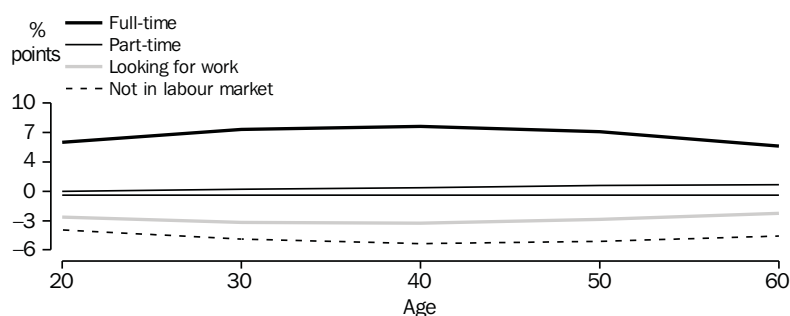
(a) Estimated based on figures on age and age-squared from tables 3.6 to 3.9.
(b) FT - working full-time
    PT - working part-time
    LKG - looking for work
    NILM - not in labour market

3.5 NET MARGINAL EFFECT OF AGE FOR FEMALES ORIGINATING FROM LOOKING FOR WORK(a)

(a) Estimated based on figures on age and age-squared from tables 3.6 to 3.9.
(b) FT - working full-time
    PT - working part-time
    LKG - looking for work
    NILM - not in labour force

Duration

The effect of duration, i.e., number of quarters in one's current labour market state, on the probability of remaining in that labour market state is always positive. Thus, the longer one stays in a particular state, the more likely one is to continue in that state. For example, every additional quarter in full-time employment increases the probability of staying there by 0.03 percentage points. On average, females working full-time have had that labour market state for about 22 quarters, so the cumulative effect is an increase of about 0.6[7] percentage points on the probability of remaining in that labour market state, for the average female. With regard to moves from full-time employment to other labour market states, an increasing duration in full-time employment reduces the probability of moving to part-time employment or to looking for work, but does increase the probability of leaving the labour market.

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7   Calculated as 0.026~0.03/quarter *22 quarters = 0.6.

Duration *continued*

Generally, the corollary applies in that the longer one stays in a particular labour market state the less likely is one to move to a different state. The two exceptions to this are moves from full-time employment to being out of the labour market (as noted above) and moves from looking for work to being out of the labour market. The longer a woman spends looking for work, the more likely she is to withdraw from the labour market.

While the partial effects presented in the tables seem quite small, the magnitudes of these duration effects are quite substantial after one takes into account how long the average female has stayed in her current labour market state. This is true particularly for females making transitions from looking for work (ranging from –5.6 percentage points for those shifting to full-time work to 8.1 percentage points for those remaining in the same state) and for females not in the labour market (ranging from –4.2 percentage points for those shifting to full-time work and 9.0 percentage points for those remaining in the same labour market state).

Employment status

Females who are self-employed are more likely than those who are wage and salary earners to remain in their current labour market state. They are also quite unlikely to shift to looking for work or to withdraw from the labour market. Self-employed females working full-time are 3.8 percentage points more likely to remain working full-time, while those working part-time are 6.6 percentage points more likely to remain working part-time.

Young children

Consistent with expectations, females who do not have young children are more likely to stay in full-time work or move to working full-time, compared to females who do have young children, all other factors constant. For example, compared to females working full-time with young children, females with no young children are 3.2 percentage points more likely to stay on working full-time and 2.8 percentage points less likely to withdraw from the labour market. They are also less likely than their counterparts with young children to remain out of the labour market, or to exit from the labour market.

The effect of having young children is particularly marked for females originating from looking for work and from being out of the labour market, as the partial effects are quite large and do not 'reinforce' the baseline probabilities. For example, for females originating from looking for work, the effect of not having young children is to decrease the probability of continuing to look for work (from 74% to 68%), and to increase the probability of moving to full-time work (from 7% to 17%). Note that only about 10% of females working full-time have young children, while the corresponding percentage for those not in the labour market is 34%.

Employment handicap

Females with an employment handicap are less likely to continue working, and the partial effects are particularly strong for females making transitions from looking for work and not in the labour market. For example, among females looking for work, those with a handicap were 8.0 percentage points less likely to shift to working full time and 1.9 percentage points less likely to shift to working part time. They were more likely to remain looking for work (4.8 percentage points) or to exit from the labour market (5.1 percentage points).

This tendency is reflected in the number of females across different labour market states—only 10% of females who work have an employment handicap, whereas 20% of females looking for work and 30% of females not in the labour market have an employment handicap.

Marital status

The results show that females who are married or in de facto relationships are more likely than unmarried females to remain out of the labour market or to leave the labour market, and quite unlikely to shift to looking for work. This pattern is consistent with exit from the labour market being more of an option for married females due to the presence, in most cases, of an earning partner.

On the other hand, unmarried females are more likely to remain in, or make the transition to, work than married females, and once working, they are more likely than married females to remain in full-time employment, but less likely to remain in part-time employment.

The partial effect of marital status is not large for females working full-time. This could indicate that women working full-time are more committed to the labour market regardless of their marital status. The effect of this variable is more significant for females in other labour market states. For example, for females looking for work, being unmarried increases the probability of shifting to full-time work (from 7% to 10%) and decreases the probability of moving out of the labour market (from 7% to 4%). Note that at least 76% of females working part-time or not in the labour market are married, while the corresponding percentages for those looking for work and working full-time are lower, at 48% and 58% respectively.

Occupation

Females in managerial and professional occupations, whether working full-time or part-time, are less likely to move to other labour market states than females from other occupations. For example, those in full-time employment are 1.9 percentage points more likely to continue working full-time, 0.7 percentage points less likely to shift to part-time work and 1.4 percentage points less likely to shift to looking for work. There may be two alternative explanations for the foregoing. On the supply side, the financial rewards from lower skill occupations are less, so

these females may be more willing to give up their jobs to look for other work, or perhaps even exit from the labour market altogether. On the demand side, there may be less job stability with lower skill occupations.

Weekly earnings

There is a clear pattern in the impact of weekly earnings on the labour market transition probabilities for female wage and salary earners. The higher one's earnings, the higher is the probability of continuing in one's current labour market state and the lower the probability of moving to any other state. Still, the overall impact of the variable is quite small, at 0.1 percentage points for the average female remaining in full-time work, 0.1 percentage points for the average female remaining in part-time work[8] and close to nil for other transitions.

3.6   MULTINOMIAL LOGIT ANALYSIS ON 3-MONTH TRANSITIONS ORIGINATING FROM FULL-TIME WORK

			Marginal effects(a)	
	Full-time work	Part-time work	Looking for work	Not in labour market
Explanatory variable	%	%	%	%
FEMALES				
Age	0.385	0.024	–0.165	–0.246
Age-squared	–0.005	0.000	0.002	0.003
Duration	0.026	–0.023	–0.015	0.012
Employment status	3.807	–1.304	–0.748	–1.766
Weekly earnings	0.009	–0.003	–0.003	–0.003
Young children	3.179	–0.490	0.046	–2.753
Employment handicap	–1.620	–0.153	0.755	1.024
Marital status	0.346	–0.162	0.423	–0.610
Occupation	–1.855	0.726	1.358	–0.230
Base probability	96.9	0.7	0.9	1.6
MALES				
Age	0.189	–0.034	–0.064	–0.091
Age-squared	–0.003	0.001	0.001	0.001
Duration	0.086	–0.006	–0.074	–0.007
Employment status	3.906	–0.793	–1.200	–1.913
Weekly earnings	0.003	–0.001	0.000	–0.001
Young children	0.883	0.026	–0.651	–0.258
Employment handicap	–3.765	0.583	1.691	1.491
Marital status	–0.461	0.287	–0.034	0.207
Occupation	–1.301	–0.339	1.784	–0.144
Base probability	97.2	0.3	1.6	0.9

(a) An estimate of the partial effect of the explanatory variable, all other factors constant.

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8   Figures on overall impact of weekly earnings computed as marginal effect multiplied by natural log of average weekly earnings for females, e.g.
For females remaining in full-time work: 0.1 ~ 0.0567 =.009 * 6.3; and
For females remaining in part-time work: 0.1 ~ 0.132 =0.024* 5.5.

3.7 MULTINOMIAL LOGIT ANALYSIS ON 3-MONTH TRANSITIONS ORIGINATING FROM PART-TIME WORK

			Marginal effects(a)	
	Full-time work	Part-time work	Looking for work	Not in labour market
Explanatory variable	%	%	%	%
FEMALES				
Age	−0.404	0.565	−0.109	−0.052
Age-squared	0.003	−0.005	0.001	0.001
Duration	−0.020	0.175	−0.103	−0.052
Employment status	0.513	6.639	−0.669	−6.466
Weekly earnings	−0.002	0.024	−0.006	−0.016
Young children	1.744	2.708	−0.905	−3.538
Employment handicap	−0.988	−1.947	0.085	2.842
Marital status	−0.400	−1.064	2.390	−0.924
Occupation	−1.873	−0.757	1.071	1.555
Base probability	1.7	92.6	1.8	3.9
MALES				
Age	0.325	0.062	0.343	−0.729
Age-squared	−0.006	0.000	−0.004	0.010
Duration	−0.235	0.607	−0.341	−0.031
Employment status	−2.851	7.493	−1.815	−2.827
Weekly earnings	−0.011	0.013	−0.004	0.001
Young children	−11.401	15.03	−1.907	−1.722
Employment handicap	−6.476	5.425	0.161	0.891
Marital status	8.981	−12.889	0.866	3.042
Occupation	−0.122	−17.532	17.980	−0.326
Base probability	5.6	89.9	2.3	2.3

(a) An estimate of the partial effect of the explanatory variable, all other factors constant.

3.8 MULTINOMIAL LOGIT ANALYSIS ON 3-MONTH TRANSITIONS ORIGINATING FROM LOOKING FOR WORK

			Marginal effects(a)	
	Full-time work	Part-time work	Looking for work	Not in labour market
Explanatory variable	%	%	%	%
FEMALES				
Age	0.722	0.241	0.337	−1.303
Age-squared	−0.012	−0.008	0.003	0.017
Duration	−1.248	−0.613	1.800	0.061
Employment status	. .	. .	. .	. .
Weekly earnings	. .	. .	. .	. .
Young children	9.136	−0.102	−6.320	−2.718
Employment handicap	−8.020	−1.920	4.819	5.129
Marital status	2.284	0.596	−0.935	−1.948
Occupation	. .	. .	. .	. .
Base probability	7.2	12.3	74.1	6.5
MALES				
Age	3.044	−0.471	−1.818	−0.755
Age-squared	−0.053	0.004	0.039	0.011
Duration	−1.616	−0.200	1.602	0.215
Employment status	. .	. .	. .	. .
Weekly earnings	. .	. .	. .	. .
Young children	11.937	7.471	−14.800	−4.608
Employment handicap	−12.578	−4.385	15.436	1.527
Marital status	−15.860	−4.389	17.742	2.507
Occupation	. .	. .	. .	. .
Base probability	19.7	6.5	71.5	2.3

(a) An estimate of the partial effect of the explanatory variable, all other factors constant.

3.9 MULTINOMIAL LOGIT ANALYSIS ON 3-MONTH TRANSITIONS ORIGINATING FROM NOT IN LABOUR MARKET

			Marginal effects(a)	
	Full-time work	*Part-time work*	*Looking for work*	*Not in labour market*
Explanatory variable	%	%	%	%
	FEMALES			
Age	−0.069	0.517	−0.178	−0.269
Age-squared	−0.001	−0.008	0.000	0.010
Duration	−0.185	−0.127	−0.085	0.397
Employment status	. .	. .	. .	. .
Weekly earnings	. .	. .	. .	. .
Young children	2.728	1.607	2.583	−6.918
Employment handicap	−1.062	−2.664	−0.956	4.682
Marital status	−0.230	−0.179	0.971	−0.562
Occupation	. .	. .	. .	. .
Base probability	1.3	4.3	2.4	92
	MALES			
Age	0.380	0.255	−1.008	0.372
Age-squared	−0.013	−0.005	0.007	0.010
Duration	−2.587	0.005	0.028	2.554
Employment status	. .	. .	. .	. .
Weekly earnings	. .	. .	. .	. .
Young children	13.656	0.923	−1.733	−12.845
Employment handicap	−10.73	−1.926	−1.533	14.188
Marital status	−15.612	−2.295	−1.267	19.173
Occupation	. .	. .	. .	. .
Base probability	9.7	3.2	6.3	80.8

(a) An estimate of the partial effect of the explanatory variable, all other factors constant.

RESULTS FOR MALES

The results for males are similar to those for females with respect to age, duration, employment status, weekly earnings and occupation. Those variables that do have a different effect on labour market state for males include young children, employment handicap and marital status (as well as slight differences with respect to age) are discussed below:

Young children

The main difference between males and females in the marginal effect of having young children on labour market transitions relates to part-time work. While females with young children were more likely than those with no young children to move into part-time work from full-time work or looking for work, the reverse is the case with males. Males with young children are less likely to remain in part-time work, or to move to part-time work, than are males with no young children. The partial effects of this variable are quite large for males with the exception of those originating from full-time work. For example, males with young children are much less likely to make a transition to full-time work—by 12 percentage points less for males originating from looking for work, and by 14 percentage points less for males originally not in the labour market. The probability of remaining in the original labour market state increases correspondingly.

Employment handicap

While females who work and have an employment handicap are more likely than their counterparts with no employment handicap to shift to looking for work or to leave the labour market, males in the same position are more likely, if employed, to remain in or move to part-time employment. This difference may reflect the greater attachment of males to the labour market. Note also that having an employment handicap has a far greater effect on the labour market state of males than females. As was shown in table 3.3 the percentage of males who have employment handicaps in the four labour market states is 11%, 20%, 34% and 63% respectively for those working full-time, part-time, looking for work, and not in the labour market. The corresponding proportions for females are much less varied at 9%, 10%, 20% and 30% respectively.

Marital status

The results for males and females with regard to marital status are very different. Whereas unmarried females were less likely than other females to remain out of the labour market, exit from the labour market, or leave full-time employment, unmarried males are more likely than other males to do so. These patterns are consistent with the higher levels of labour market participation of married males compared with unmarried males and of unmarried females compared with married females. This may partly reflect the economic roles within marriage, but also may reflect the selection involved in marriage—males with better economic prospects are more likely to be a partner in a couple.

Age

For males originally looking for work or not in the labour market, age effects are more pronounced than for females (i.e. an increasing likelihood of remaining in the same state). As with females originating from full-time work, and to a certain extent for those originating from part-time work, the age effect for males in these labour market states is roughly constant between the ages of 20 and 60 years.

In conclusion, the partial effects provide information on the impact of each variable, all other factors constant, on the probability of staying in a particular labour market state or moving to another. We find that the impact of the explanatory variables differed according to sex and the type of transition.

For females, transitions that involve remaining in one's current labour market state (e.g. remaining in full-time work, remaining in part-time work, etc.), the baseline probability was quite large and the overall effect per explanatory variable[9] quite small (ranging from nil to a high of 8.1 percentage points) so the effect of changing any one variable was minimal. For males, the same held true only for the transition remaining in full-time work. For transitions that involved remaining in the three other labour market states, the baseline probability was still high but the overall effect per explanatory variable was also quite high. Consequently nearly all the explanatory variables included in the model had an important contributory effect.

For transitions involving shifts from one labour market state, the baseline probability was often so small that the contributory effect of changing the value of almost any one variable substantially affected the probability of the transition. In such cases, we find that nearly all variables (except for weekly earnings) had a significant effect on the probability of moving from one labour market state to another[10].

For both males and females, being self-employed, not having young children, or being in a high-skill occupation, increases the probability of remaining in one's current labour market state. Female respondents with an employment handicap are more likely to shift to looking for work or to exit from the labour market. Their male counterparts are also likely to shift to or remain: in part-time work, looking for work, or out of the labour market.

Age, duration in one's current labour market state and weekly earnings all show clear patterns of impact, with each variable serving to increase the probability of remaining in one's current labour market state. Broadly, the older one is (between the ages of 20 and 60), the longer the duration in the current state and the higher the level of earnings, the more likely one is to remain in that state.

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9   For categorical variables, the overall effect is simply the marginal effect presented in Tables 3.6 to 3.9. For the continuous variables (except age), the overall effect is estimated as the product of the marginal effect multiplied by the mean value of the variable, by sex and labour market state.

10   English speaking ability also has high partial effects. However, the model coefficients on this variable were based on insufficient data. Hence another set of runs was made excluding this variable.

The results with respect to the other variables are quite different, depending on gender and labour market state, and cannot be generalised. In particular, the effect of marriage is quite different for males and females, though this is consistent with their different labour market patterns. While unmarried females are more likely to work full-time or to be looking for work, married females have a greater probability of working part-time or leaving the labour market. In contrast, unmarried males are more likely than married males to be looking for work or out of the labour market. With respect to young children, the main difference between males and females relates to part-time work. While females with young children were more likely than those with none to move into part-time work from full-time work or looking for work, the reverse is the case with males. Males with young children are less likely to remain in part-time work, or to move to part-time work, than are males with no young children.

Finally, at first glance the separate impact of each explanatory variable appears to be quite small, particularly for females, and the effect is merely to reinforce the existing set of transition probabilities. However, one should keep in mind that the marginal effects presented were estimated based on changes in a relatively short period of time—a quarterly period—and that within this period we do not expect a lot of individuals to be experiencing changes in labour market state.

CHAPTER 4   CONCLUSION

The availability of longitudinal data has afforded us a new view of the Australian labour market, supplementing the 'snapshot' information provided by conventional statistics generated on labour and employment. This study used data from the general population sample included in the SEUP, firstly, to describe aspects of Australian labour market dynamics and, secondly, to estimate transition probabilities for movement between different labour market states.

Key findings from the first part of the report, describing aspects of the dynamics, included the following:

- There is a high degree of state dependence—particularly in the monthly and quarterly transitions—with most flows between different labour market states ranging from one to ten per cent of people in the original labour market state.

- The pattern of transitional probabilities for males differs from that of females in one major respect. The picture for males is dominated by full-time employment and flows to and from full-time employment. For females, part-time employment and being out of the labour market are also important states, and there is an accordingly broader pattern of labour market flows among these three labour market states.

- Younger males and females make more labour market transitions, and so do those in lower occupations, i.e. intermediate and elementary clerical, sales and service workers, intermediate production and transport workers, and labourers and related workers.

- Transitions across industry, sector and employment status occur very infrequently. On an annual basis, at least 96% of those people who were employed remained in the same category of industry, sector or employment status—and over a three-year period, the corresponding percentage is 89%. Transitions by occupation are made more frequently. On an annual basis 94% stayed in the same occupation but over a three-year period 59% made one to two transitions. The probability of movement into a higher-skilled occupational category appeared higher for males than for females.

In the second part of the report, labour market transition probabilities were estimated. These were undertaken separately for females and males, and used a range of independent variables.

- While the measured impact of each explanatory variable, all other factors constant, appear to be quite small with a very high probability of staying in the same labour market category, this is due to the short period under analysis and a generally high degree of labour market stability. We find that the impact of the explanatory variables varied according to sex and the type of transition. For females in transitions that involve remaining in one's current labour market state the effect of changing any one variable was minimal. For males, the same held true only for the transition remaining in full-time work. For all other transitions, most of the explanatory variables included (except for weekly earnings) had an important effect on the probability of moving from one labour market state to another.

- The estimations reveal an intricate pattern of influences on the probabilities of transition, though with age, duration, employment status, young children, employment handicap, marital status and occupation as the factors that have the greatest impact on the probability of moving from one labour market state to another. For both males and females, being self-employed, not having young children, and being in a high-skill occupation increases the probability of remaining in one's current labour market state. Male and female respondents with an employment handicap are generally more likely to shift to looking for work, or to exit from the labour market.

- Age, duration in one's current labour market state and earnings all show clear patterns of impact. Broadly, the older one is (if looking for work or not in the labour market), the longer the duration in the current state and the higher the level of earnings, the more likely one is to continue working.

- The results with respect to the other variables are quite different depending on gender and labour market state and cannot be generalised. In particular, the effect of marriage is quite different for males and females. While unmarried females are more likely to work full-time or to be looking for work, married females have a greater probability of working part-time or leaving the labour market. Conversely, unmarried males are more likely than married males to be looking for work or out of the labour market. With respect to young children, the main difference between males and females relates to part-time work. While females with young children were more likely than those with none to move into part-time work from full-time work or looking for work, males with young children are less likely to remain in part-time work, or to move to part-time work, than are males having no young children.

Given the focus of this paper was to describe and analyse labour market dynamics across the whole population, the study was restricted to the Population Reference subgroup of the SEUP, for which the sample size is quite limited relative to the two other SEUP subgroups. However, there are a number of other areas for further study in the area of labour market dynamics that could utilise the SEUP. Interesting areas for future study could focus on selected labour market transitions, particularly part-time work, and investigate the changing degree of attachment to the labour market by gender.

APPENDIX A

SELECTION OF EXPLANATORY VARIABLES

This appendix describes the procedure and statistical criteria adopted for selecting variables for the multinomial logit analyses. While the text of the report refers only to three-monthly transitions, some references in the Appendix to monthly transitions have been retained. As indicated in the body of the report, the results for one-month and three-month transitions are very similar and we chose to focus the analysis on the three-month transitions mainly because the magnitude of marginal effects is greater.

ASSOCIATION BETWEEN LABOUR MARKET STATE AND EXPLANATORY VARIABLES

Chi-square values were calculated following maximum likelihood estimation of parameters, to test whether there was a significant association between the labour market state category and the category of the explanatory variable, for each explanatory variable. The weights used in the calculation of each chi-square were population weights adjusted so that the sum of the weights was equal to the average sample size per day (2016.33)[1]. These are referred to here as 'sample size weights'. The use of these weights ensured that the chi-squares were based on the correct relative weights but were similar in magnitude to the values that would have been obtained from the frequencies for a single day. That was appropriate since the data consist of up to 18 repeated measurements on the same individuals, which lack independence. The chi-squares are shown in table A.1, with degrees of freedom in brackets.

Some comments on the table A.1 for the case of four classes of labour market state are:

- The chi-squares for age and age squared were high. Reference to the table of means and medians, given previously, reveals that the average age of both males and females tended to be lowest for class 3 ('looking for work') and highest for labour market class 4 ('not in the labour market').

- The chi-squares for duration and for weekly earnings were consistently the highest. For both males and females, the average for months was relatively low for class 3 ('looking for work') and the average for weekly earnings for class 1 ('full time employment') was more than twice the average for class 2 ('part time employment').

- The chi-squares for occupation were high. The main variability was in the percentage of professionals or para-professionals, ranging from 8.0% for females in class 3 ('looking for work') to 38.0% for females in class 1 ('full-time employed').

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1   The data from the 18 days were combined to produce a sample consisting of 6*(2145+2007+1897)=36294 observations. Thus the average number of observations per day was 36294/18=2016.33.

- The chi-square for time of year was always the lowest, followed by the chi-squares for sector or employment status and then for industry.

- The chi-square for young children was high for females. The percentage of females who had children aged 0 to 4 years was 9.9%, 22.5%, 24.5% and 34.3% for labour market classes 1, 2, 3 and 4, respectively.

- The chi-squares for educational attainment were high. The percentage of respondents who had gained post-school qualifications was high for labour market class 1, intermediate for class 2 and low for classes 3 and 4. The relationship was reversed for respondents who had not reached the highest level of secondary school.

- The chi-square for English speaking proficiency was high for females. The percentage of females who spoke good English was 98.3% and 97.3% in classes 1 and 2, respectively, and 90.3% and 91.8% in classes 3 and 4, respectively.

- The chi-squares for employment handicap were high, particularly for males. For both males and females, the percentage of respondents who had a condition which was a handicap to employment increased steadily from class 1 to class 4, for example, 64.3% of males in class 4 had a condition which was a handicap to employment.

- The chi-squares for marital status were high but the patterns for females and for males were different. For females, the percentage who were married or were in a de facto relationship was highest for class 4 (78.0%) and lowest for class 3 (48.3%), while for males the percentage was highest for class 1 (69.4%) and lowest for class 3 (42.1%).

A.1 CHI-SQUARE TO TEST ASSOCIATION OF LABOUR MARKET STATE AND CONTINUOUS EXPLANATORY VARIABLES(a)

Explanatory variable	Female	Male
Age	61.0 (3)	21.3 (3)
Age squared	12.4 (3)	56.8 (3)
Duration	69.5 (3)	131.0 (3)
Duration squared	17.9 (3)	18.6 (3)
Weekly earnings	344.0 (1)	116.9 (1)
Weekly earnings squared	6.8 (1)	0.7 (1)
Hourly earnings	18.5 (1)	3.1 (1)
Hourly earnings squared	33.1 (1)	14.0 (1)
Industry	9.0 (6)	7.0 (6)
Occupation	45.8 (12)	46.9 (12)
Sector	3.7 (1)	2.4 (1)
Employment status	4.7 (1)	1.8 (1)
Time of year	0.2 (6)	0.2 (6)
Young children	60.2 (3)	8.8 (3)
Educational attainment	41.3 (6)	43.3 (6)
English proficiency	21.4 (3)	5.7 (3)

(a) Degrees of freedom are shown in parentheses.

Association between
transition probabilities and
explanatory variables

As an example of a cross-classification with an explanatory variable, consider the case of a three month transition for females who were initially in class 1. At the end of the three month period each respondent was in either class 1, class 2, class 3 or class 4. The cross classification with young children is given in the following table. Since the data were obtained from twelve observations per person, the raw frequencies which resulted from a weighted cross-tabulation were divided by 12 to produce the frequencies shown in table A.2.

A.2   DISTRIBUTION OF LABOUR MARKET STATE FOR FEMALES INITIALLY IN FULL-TIME WORK

| | Labour market state at end of three month period | | | | |
Young children class	Full-time work	Part-time work	Looking for work	Not in labour market	Total
Children aged 0 to 4 years	164 896 (9.4)	2 124 (17.5)	1 216 (7.8)	11 169 (39.4)	179 405 (9.9)
No children aged 0 to 4 years	1 588 902 (90.6)	9 981 (82.5)	14 287 (92.2)	17 216 (60.6)	1 630 386 (90.1)
Total	1 753 798 (100.0)	12 105 (100.0)	15 503 (100.0)	28 385 (100.0)	1 809 791 (100.0)

A weighted chi-square was calculated to test the association of the factors in the preceding table. The weights were adjusted so that they were 'sample size weights', for which the sum was equal to the average sample size per day (2016.33), then multiplied by a set of multiplying factors (table A.3) which is the average number of different transitions per person across the 12 three-month intervals[2]. The multiplying factors do not change the relative weights and consequently do not produce changed estimates of population frequencies or proportions, but they do have the effect of multiplying chi-squares by the multiplying factor. Note that the adjustment of weights to sample size weights, and multiplication by the multiplying factors, presents more conservative chi-square estimates than if unadjusted population weights had been used.

2   Consider the transitions for one person, denoting a transition from class i to class j over a three month period as an i/j transition. If, for example, a person remained in class 1 throughout the three years of the survey, then all of their transitions were of type 1/1. If a person was in class 1 at the beginning of the survey and moved to class 2 after, say, one year, and remained there for the rest of the survey period, then their transition types were 1/1, 1/2 and 2/2. The average number of different three month transitions per female, from class 1, was found to be 1.8. It was therefore assumed that, on average, each female contributed information on 1.8 independent transitions.

For example, in the case of females who were initially working full-time, each sample size weight was multiplied by 1.8, and the adjusted weights were used in the calculation of chi-square. In this instance the chi-square was 6.35 with 3 degrees of freedom, giving a p-value of 0.096. The conclusion is that the two variables were associated and an inspection of the data reveals that the females who changed from class 1 to class 4 were more likely to have children aged 0 to 4 years than were the remaining females who commenced in class 1.

A.3   MULTIPLYING FACTORS

		Labour market state at beginning of period			
Transition period	Sex	Full-time work	Part-time work	Looking for work	Not in labour market
1 month	Female	1.7	2.3	4.7	2.3
	Male	1.5	3.4	4.5	4
3 months	Female	1.8	2.5	4.9	2.5
	Male	1.5	3.5	4.7	3.9

Table A.4 shows the chi-squares to test the association between transition rates and the explanatory variables. For continuous explanatory variables, chi-squares were obtained from fitting weighted logistic regression models with a linear term for each explanatory variable. The effects of adding quadratic terms to linear terms were also tested.

The chi-squares for occupation were generally low, with p-values close to 1. The five occupation classes were therefore amalgamated in various ways until the system of amalgamation was found for which the p-values were lowest. The best results were obtained from the combination of occupation classes 1 and 2 into one class and classes 3, 4 and 5 into a second class.

A similar amalgamation procedure was investigated for industry, for which the chi-squares were also low. No method of amalgamation was found which produced p-values sufficiently low to warrant adoption of the method.

Explanatory variable	Degrees of freedom	Full-time work Female	Full-time work Male	Part-time work Female	Part-time work Male	Looking for work Female	Looking for work Male	Not in labour market Female	Not in labour market Male
Age	3	3.5 0.319	5.7 0.129	26.3 0.000	12.4 0.006	11.2 0.011	15.4 0.002	35.4 0.000	36.1 0.000
Age squared	3	2.0 0.566	2.2 0.540	1.6 0.650	2.0 0.564	1.7 0.635	8.5 0.036	1.3 0.734	1.5 0.682
Duration	3	3.1 0.375	17.5 0.001	18.0 0.000	11.4 0.010	13.3 0.004	22.2 0.000	31.9 0.000	37.9 0.000
Duration squared	3	1.1 0.782	1.6 0.664	3.7 0.292	0.0(2) 1.000	0.8 0.842	3.8 0.285	0.2(2) 0.923	0.9 0.828
Weekly earnings	3	3.6 0.303	1.0 0.794	13.6 0.004	5.3 0.150	. .	. .	. .	. .
Weekly earnings squared	3	4.4 0.218	4.0 0.256	4.1(2) 0.129	2.3 0.514	. .	. .	. .	. .
Hourly earnings	3	3.3 0.345	1.1 0.767	7.5 0.057	4.7 0.193	. .	. .	. .	. .
Hourly earnings squared	3	3.9(2) 0.143	4.1 0.254	1.3(2) 0.522	4.1 0.251	. .	. .	. .	. .
Industry	6	0.2 1.000	1.5 0.961	2.5 0.869	0.9 0.990	3.5 0.747	7.2 0.306	2.8 0.837	3.6 0.724
Occupation	12	6.7 0.876	13.3 0.348	11.4 0.495	6.7 0.877	6.9 0.865	13.7 0.323	3.9 0.985	9.6 0.650
Employment status	3	0.1 0.996	2.3 0.509	2.7 0.433	3.0 0.390	. .	. .	. .	. .
Sector	3	0.5 0.920	1.6 0.660	1.9 0.589	0.6 0.893	. .	. .	. .	. .
Time of year	9	1.9 0.993	4.9 0.845	4.2 0.895	6.6 0.679	1.0 1.000	4.8 0.855	4.0 0.910	4.0 0.913
Young children	3	6.4 0.096	1.0 0.809	3.7 0.300	1.1 0.778	3.8 0.290	3.6 0.304	2.0 0.575	0.8 0.847
Educational attainment	6	1.5 0.958	5.4 0.496	3.9 0.685	3.3 0.767	3.3 0.770	3.3 0.718	8.5 0.203	8.4 0.212
English speaking proficiency	3	0.4 0.947	0.4 0.934	2.0 0.564	2.4 0.498	8.7 0.034	3.4 0.341	4.0 0.257	0.8 0.847
Employment handicap	3	0.6 0.901	9.9 0.019	4.5 0.210	1.8 0.613	5.3 0.150	15.0 0.002	6.0 0.112	26.5 0.000
Marital status	3	2.1 0.543	2.6 0.460	15.2 0.002	8.4 0.038	3.4 0.338	0.9 0.833	4.7 0.199	4.3 0.231

(a) The first value in each cell is the chi-square value and the degrees of freedom are shown in brackets if they differ from the value shown in the second column. The p-value of the chi-square is shown on the second line of each cell.

APPENDIX B   **USING THE FITTED EQUATIONS TO ESTIMATE TRANSITION PROBABILITIES**

Consider the example of female transitions form full-time work for a quarterly transition period. The multinomial logit analysis produced three fitted equations, corresponding to those continuing in full-time work and those making transitions to part-time work and to looking for work. The parameter estimates which produce these equations are shown in table B.1[1].

From the estimates in table B.1, the estimation equation for transitions to full-time work (T(1))   is:

= 0.1659
  + 0.1604 * (age)
  − 0.0019 * (age squared)
  − 0.0073 * (duration)
  + [− 0.5821 if employment status = 1] or [+ 0.5821 if employment status = 2]
  + [0.0017 * (weekly earnings) if employment status = 1]
  + [− 0.8931 if young children = 1] or [+ 0.8931 if young children = 2]
  + [+ 0.3345 if employment handicap = 1] or [− 0.3345 if employment handicap = 2]
  + [− 0.1962 if marital status = 1] or [+ 0.1962 if marital status = 2]
  + [− 0.0638 if occupation = 1] or [+ 0.0638 if occupation = 2]
= log (P11/P14)

Similarly, the estimates in table B.1 may be used to produce estimation equations for transitions to part-time work and transitions to looking for work. These may be evaluated for a particular individual for whom the values of the explanatory variables are known. The exponentials of these values are then calculated, giving

ET(1) = exp(T(1)), ET(2) = exp(T(2)) and ET(3) = exp(T(3)).

If we denote ESUM as the sum of these variables, plus 1,
        i.e. ESUM = 1 + ET(1) + ET(2) + ET(3)

then the estimated transition probabilities can be calculated as follows:

- to full-time work: P(1) = ET(1)/ESUM;

- to part-time work: P(2) = ET(2)/ESUM;

- to looking for work: P(3) = ET(3)/ESUM; and

- to not in labour market: P(4) = 1/ESUM.

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1   For a categorical explanatory variable with two classes, only the first parameter estimate was given (by SAS) but the second parameter estimate could always be calculated since the two estimates were constrained to sum to zero.

B.1 MULTINOMIAL LOGIT COEFFICIENTS FOR FEMALES ORIGINATING FROM FULL-TIME WORK

	Labour market state at the end of the three-month period		
Explanatory variable	*Full-time work*	*Part-time work*	*Looking for work*
Intercept	0.1659	−4.2439	−0.0582
Age	0.1604	0.1923	−0.0349
Age squared	−0.0019	−0.0020	0.0007
Duration	−0.0073	−0.0419	−0.0254
Employment status			
Wage and salary earner	−0.5821	0.4110	−0.1277
Self-employed	0.5821	−0.4110	0.1277
Weekly earnings (Status = wage and salary earner)	0.0017	−0.0029	−0.0020
Young children			
Yes	−0.8931	−0.5114	−0.9036
No	0.8931	0.5114	0.9036
Employment handicap			
Yes	0.3345	0.4405	−0.1131
No	−0.3345	−0.4405	0.1131
Marital status			
Married or de facto	−0.1962	−0.0733	−0.4404
Single	0.1962	0.0733	0.4404
Occupation			
Mgr/admin/professional	−0.0638	−0.6150	−0.8631
Otherwise	0.0638	0.6150	0.8631

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