The Causes of Long-Term Income Support Receipt Associated with Unemployment

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Executive Summary

- This study investigates the causes of long-term receipt of income support payments associated with unemployment. While the roles played by a variety of factors are investigated, a particular focus of the study is on the extent, nature and persistence of 'duration dependence' of income support receipt for unemployed customers. Our basic question here is *Controlling for the effects of other characteristics, is the probability of exiting payments negatively related to duration on payments, and what is the extent of this duration dependence?* But a further important question in this regard is *Do these effects persist from one spell to the next, and what is the extent and nature of this persistence? For example, how rapidly to duration effects 'evaporate'?*
- Duration effects refer to the effects of a number of factors that could affect the likelihood of exit from unemployment or welfare receipt, and which manifest as effects which depend on spell duration. Sources of duration effects include scarring or stigma effects associated with unemployment and skill atrophy, loss of networks and deterioration in health associated with non-employment. It is on the basis that these sources of duration effects are unlikely to completely disappear – nor completely remain – on recommencement of employment, that we investigate the extent and nature of so-called 'lagged duration effects'.
- The dataset used is a ten per cent random sample of all unemployment payment recipients in the period January 1995 to March 2003. It comprises complete fortnightly income support payment records for each individual in the sample, thereby allowing us to track income support receipt of each individual over more than eight years. For reasons detailed in the report, the analysis focuses on all income support receipt of males aged 25-44 years who commenced a spell on unemployment payments in 1997 or 1998 after at least two years off all income support payments.
- Duration analysis methods are employed to investigate the causes of long-term income support receipt associated with unemployment. This involves estimation of econometric models of the hazard rate for exit from income support payments. The hazard rate gives the probability of exiting income support at each spell duration, conditional on having reached that duration. We take this approach because it is robust to censoring (spells of unknown completed duration) and does not 'waste' information.
- The hazard rate is modelled as a function of a range of factors, including individual socio-demographic characteristics (such as age, country of birth, family circumstances and living

arrangements) and administrative information on level of labour market engagement (such as payment type, activity type and labour market earnings). To investigate duration effects, a range of variables are included for current-spell duration, previous-spell duration and length of break between current and previous spell. However, necessitated by the limited (eight-year) time span of the data, we impose an assumption that lagged duration effects do not persist beyond two years. Thus, the effects of previous spells ending more than two years prior to the current spell and breaks longer than two years are not examined.

- The main results from the hazard function models with respect to variables other than duration variables are as follows:
  - The older the age of entry into unemployment benefits, the greater the risk of a long-term spell on income support.
  - All else equal, immigrants from English-speaking countries have significantly higher hazard rates (conditional probabilities of exiting income support) than both the Australian-born, who in turn have significantly higher hazard rates than immigrants from non-English speaking countries.
  - Having a partner who is not on income support is associated with a substantially higher hazard rate than being single or, indeed, having a partner who is on income support.
  - Residing in public housing is associated with a significantly lower hazard rate.
  - Variables capturing the level of engagement with the labour market in terms of payment type and activity types are all statistically significant and of expected sign. Interestingly, however, earnings while on income support do not appear to affect the hazard rate.
  - The estimates imply that demand conditions faced by the individual impact on the likelihood of exit from income support receipt, with the contemporaneous local unemployment rate significantly impacting on the hazard rate in a negative fashion.
- Coefficient estimates for the variables for current spell duration imply positive duration dependence up to three months spell duration and a general pattern of negative duration dependence thereafter – that is, the predicted hazard rate (predicted probability of exiting income support) is increasing in spell duration up to three months and generally decreasing in duration thereafter. The only exception is a slight increase in the predicted hazard rate at the duration indicated by the '10 months' variable – which is in fact at the 37-40 week

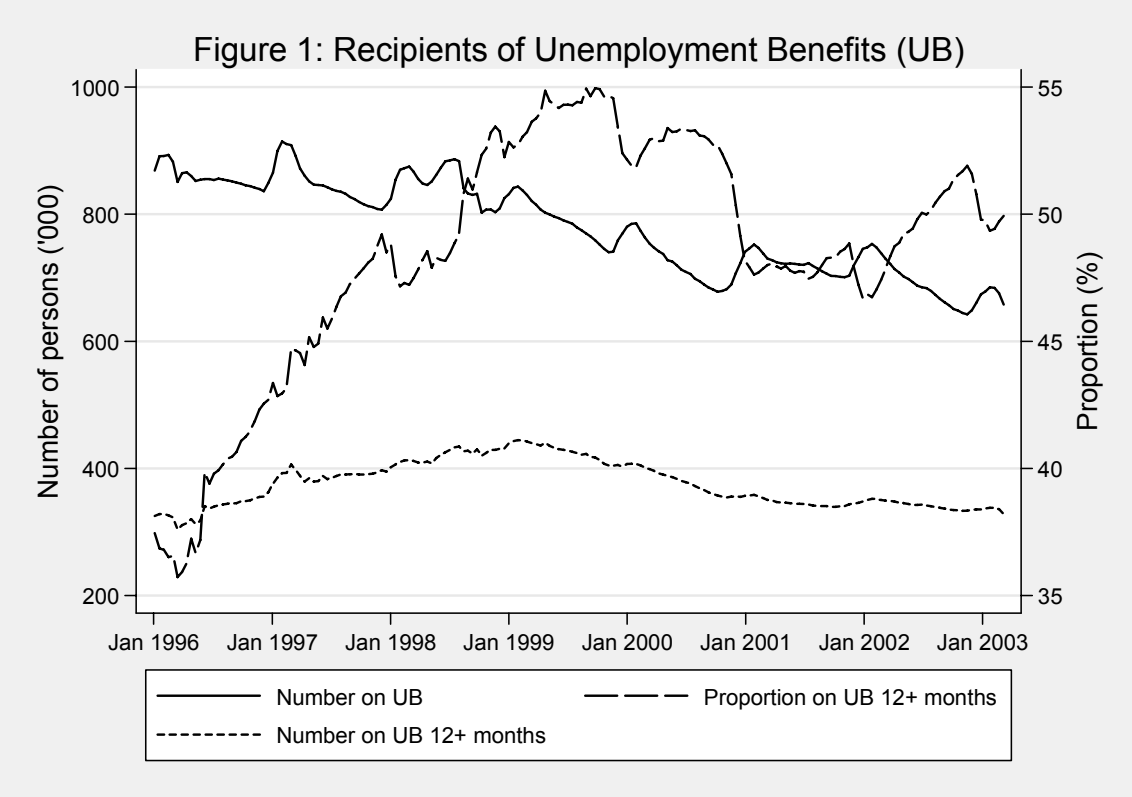
duration, coinciding with the nine-month review process for NewStart Allowance recipients that was in operation in the sample period.

- With respect to lagged duration effects, we find:
  - A prior income support spell ending within two years of commencement of the current spell decreases the hazard rate, and this effect is greater the longer that previous spell.
  - The predicted hazard rate is increasing in the length of the break between the previous spell and the current spell up to approximately twelve months. Breaks longer than twelve months are, on average, not associated with significantly different hazard rates from breaks of 9-12 months.
  - Further investigation also reveals that there are important differences in the role of break length by length of previous spell:
    - Substantial negative effects are found for previous spells in excess of 12 months duration which, while decreasing in the length of the break for breaks up to 9-12 months, remain substantial even after a two-year break. Thus, there is evidence of a permanent scarring effect of long-term income support receipt.
    - For intermediate previous spell lengths of between 6 and 12 months, negative effects are confined to those that ended within 6 months of commencement of the current spell. That is, spells of 6-12 months that ended more than 6 months prior to the start of the current spell appear to be *irrelevant* to the rate of exit from the current spell.
    - For previous spells less than 6 months, there is a *positive* lagged duration effect, which is also increasing in break length up to approximately 12 months. We suspect that the high exit rate for those with short previous spells is driven by those with a predisposition towards churning – an unobserved characteristic our model estimation to date has not been able to capture.
- The results obtained from models estimated are clearly potentially very valuable to policy makers. Our findings imply that information on previous income support receipt should be a factor in determining appropriate policy interventions with respect to individuals entering unemployment benefit receipt. Holding all else constant, a long-term spell ending within the last two years puts an individual entering benefit receipt at a much elevated risk of another long-term spell on income support; while a spell of between 6 and 12 months ending within

the last 6 months also elevates this risk. Utilisation of this information by the *Job Seeker Classification Instrument* and/or the *Active Participation Model* in the determination of employment services delivery is likely to improve the efficacy of these policy instruments.

1 Introduction

While fourteen years of strong economic growth in Australia has led to an unemployment rate at its lowest level in nearly 30 years, long-term unemployment remains a significant feature of the Australian labour market. For example, according to Australian Bureau of Statistics (ABS) estimates, in January 2005 there were 102,400 persons who had been unemployed for twelve months or more. More significant from a welfare policy perspective is that the number of persons who have been in continuous receipt of unemployment payments for more than twelve months was in excess of 380,000 in early 2003 (see Figure 1). Needless to say, long-term unemployment, and more particularly long-term income support receipt by unemployed customers, is of considerable concern to policy-makers. Policies that can reduce the occurrence of long-term income support receipt associated with unemployment are therefore keenly sought.



It is important for the design of policies aimed at reducing long-term unemployment that policy-makers understand its causes, and it is on this front this project seeks to contribute. Specifically, the purpose of this paper is to investigate, using payments administration records, the factors associated with long-term receipt of income support by unemployed customers. While this

includes investigation of the effects of a variety of individual characteristics, the nature of the data used – panel data with a fortnightly periodicity spanning nearly eight years – means it is well-suited to investigation of perhaps one of the more important issues for policy-formulation with respect to the long-term unemployed: the role of individual characteristics versus the role of 'duration dependence'. 'Characteristics' comprise all personal characteristics likely to impact on labour force or welfare receipt status. They include those characteristics that we do not observe in the data, in particular such nebulous traits as personal motivation. 'Duration dependence' refers to the extent to which time in the state of unemployment or welfare receipt itself makes continued unemployment or welfare receipt more likely. We therefore investigate the relative roles of these two factors, particularly focusing on the nature of duration effects, including the extent to which they *persist* from one income support spell to the next, and how this persistence depends on both the time since the previous spell ended and the length of that previous spell.

Identifying the relative roles of individual characteristics and duration effects is of fundamental importance to policy formulation. In crude terms, the more important are individual characteristics, the more policies should target those with characteristics that put them at greatest risk of long-term unemployment. On the other hand, the more important are duration effects, the more policies aimed at reducing long-term receipt of income support should be based on a recipient's history of payment receipt to that point in time.

Clearly, it is also important to understand the nature of both of these types of effects. For characteristics, this involves identifying the effects of specific observed characteristics, such as sex, age and family type. However, also likely to be important are unobserved characteristics, the aggregate effects of which can be identified, but not the individual contributions of the specific characteristics they embody. The policy implications of a significant role for unobserved characteristics are therefore primarily that more efforts should be made to identify what these traits are. Understanding the nature of duration effects involves identifying not only the effects of current spell duration, but also identifying the persistence of duration effects through examination of dimensions such as the length of time since previous spell and durations of previous spells. For example, a finding that duration effects persist from one spell to the next if the gap between spells is less than six months implies that a specific policy focus on those who return to unemployment benefit receipt within six months of leaving would be particularly valuable to the minimisation of long-term income support receipt by unemployed customers.

While the more general issue of duration dependence versus characteristics represents an important addition to the Australian literature, this study will also contribute to the international

literature through its investigation of the *persistence* of duration effects. Persistence of duration effects from one spell to the next might be expected because the underlying reasons for duration effects are unlikely to immediately disappear once a spell ends. For example, if duration effects derive from skill atrophy, loss of work habits and loss of networks, these are unlikely to be completed restored after only a short stint of employment. This issue has received scant attention in previous research, no doubt because of the demanding data requirements of such a line of inquiry, which comprise detailed multiple spell data. Such datasets are rare, and the FaCS administrative data set therefore provides a somewhat unique opportunity to investigate this issue.

The approach we take in this paper is to use duration analysis methods. Duration analysis involves estimation of the probability of exit at a given spell duration conditional on exit not having occurred up until that duration. This conditional probability is known as the hazard rate. Alternatively, it can involve estimation of the probability of non-exit up until a given duration, which is the survival function. An advantage of the duration analysis approach is that it does not 'waste' information. For example, if we were to examine the predictors of becoming long-term unemployed (a dichotomous dependent variable), this would not distinguish different lengths of long-term unemployment. Duration analysis also handles well instances of 'right-censoring' – where an unemployment spell is still in progress at the end of the sample period – essentially by redefining the dependent variable so that it is never censored. That is, the conditional probability of exit at a given duration, given exit has not occurred up until that duration, can be estimated over all spells observed to reach that duration. Ordinary least squares estimation of total spell duration would, by contrast, suffer from biases created by right-censoring for all spells still in progress at the end of the sample period.

2 Previous literature on unemployment spell duration

There is a large volume of international literature studying unemployment spell durations or transitions. Devine and Kiefer (1991) provide a survey of the extensive literature up until 1990, while more recent work includes Carling and Jacobson (1995) , Van den Berg (1995), Van den Berg and Van Ours (1996), Abbring et. al. (1997), Omori (1997), Rosholm (1997), Baker and Melino (2000), Belzil (2001), Boheim and Taylor (2002), Erberwein etal (2002), Roed and Nordberg (2003), Van Den Berg et. al. (2003) and Lalive et. al. (2004). Much of the literature is grounded in Mortensen's (1977) job search model, or further developments of the model.

Mortensen (1977) posits that duration in an unemployed state is the outcome of the interaction between reservation wages and the arrival of offer wages, each of which can itself depend on spell duration. Issues considered by the empirical work include the appropriate parametric restrictions on the hazard function, the role of unobserved heterogeneity, the forms of state dependence in exit probability from unemployment and the effects of various characteristics and policy interventions on spell duration.

Available data has restricted Australian empirical research on unemployment spell durations. Three recent Australian studies use the ABS Survey of Employment and Unemployment Patterns, a panel that ran from 1994 to 1997. Stromback et. al. (1998), Dockery and Stromback (2000) and Kalb (2000) all estimate Weibull hazard models of exit from unemployment. Although they focus primarily on effects of individual characteristics, all studies necessarily produced estimates of effects of current spell duration on exit probability. The Weibull model imposes a parametric specification of the duration effect, reducing estimation of duration effects to estimation of a single parameter. While Stromback et. al. and Dockery and Stromback find a strong negative duration effect, they do not control for unobserved heterogeneity. Kalb allows for unobserved heterogeneity by assuming it has a Gamma distribution and finds no significant duration effects.

Earlier Australian empirical studies that examine the effects of unemployment spell duration on exit probability include Trivedi and Hui (1985), Brooks and Volker (1986) and Chapman and Smith (1993). Brooks and Volker use gross flows data from the ABS monthly labour force survey spanning the period March to June 1984 to examine the dependence of the probability of leaving unemployment on spell duration. They estimate separate Weibull models for each of six groups defined by sex and age group, with no explanatory variables other than spell duration included in their specifications. For all groups they find strong negative duration dependence for the hazard rate. Trivedi and Hui (1985) use the same data as Brooks and Volker and also find negative duration dependence.

Chapman and Smith (1993) use the Australian Longitudinal Survey to examine a cohort of unemployed youth in 1985 for the duration of their unemployment spells (unless incomplete by 1988). They estimate Weibull and Exponential models of the hazard rate and for both models find little evidence of duration dependence for this unemployment cohort, all of whom were aged 16-25 years in 1985.

A number of Australian studies have also focused on identifying the extent of long-term unemployment or the duration distribution of unemployment spells more generally, including Alaouze (1984), Brooks and Robinson (1983), Foster (1981) and Trivedi and Baker (1983), Junankar and Kapuscinski (1991), Chapman (1993) and Dixon and Lim (2004). A further study in this mould that more closely matches the focus of the current study is by Blackham et al (2003), which examines duration on income support of unemployed customers. Consistent with the evidence presented in Figure 1, they find an increase in the proportion of unemployed customers with long-term durations on income support between May 1999 and May 2002.

3 Discussion of Duration Effects

The term 'duration effects' refers, in the current context, to the effects of a number of factors that could affect the likelihood of exit from unemployment or welfare receipt, and which manifest as effects which depend on spell duration.[1] It is because the effects of these factors depend on duration that they can be estimated via investigation of the association between spell duration and likelihood of exit. Duration effects can be conceived in terms of the broader notion of 'state dependence' considered by Heckman and Borjas (1980). Heckman and Borjas identify four broad types of state dependence: (1) Markovian state dependence, whereby being in a given state of itself alters the probability of subsequently being in that state; (2) occurrence dependence, whereby the number of previous spells in the state affects the probability of being in that state; (3) duration dependence, whereby the probability of remaining in a state depends on the length of the current spell in that state; and (4) lagged duration dependence, whereby durations of previous spells affect the probability of being in the state.[2]

Markovian state dependence is an entirely 'on or off' proposition, and might reflect costs of both entry to and exit from unemployment. Occurrence dependence might reflect scarring or stigma effects of unemployment that do not depend on duration of unemployment or time elapsed since those spells occurred.

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[1] Our subsequent discussion of duration effects will assume a focus on unemployment spell duration. Note, however, that because our analysis employs administrative data, our empirical analysis departs somewhat from this focus. This is further discussed in Section 7.

[2] Heckman and Borjas discuss lagged duration effects in terms of durations of previous unemployment spells impacting on probability of exit from a current unemployment spell. However, their two-state model of employment and unemployment actually permits lagged duration effects to derive from previous spell durations in both states (unemployment and employment).

In this paper, our attention is on the third and fourth forms of state dependence identified by Heckman and Borjas, both of which can be interpreted as duration effects. The first, duration dependence, refers to effects of current spell duration, while the second, lagged duration dependence, encompasses duration effects from all previous spells in all states.

Effects associated with the duration of the current unemployment spell could derive from loss of human capital (skill atrophy), job networks and work habits, and possibly even from adverse health consequences of unemployment (Phelps, 1972). Duration effects could also reflect scarring or stigma effects to the extent that they are cumulative functions of time unemployed (Schweitzer and Smith, 1974).[3]

Duration effects that are increasing in spell duration are unlikely to completely evaporate on exit from an unemployment payment spell. Restoration of human capital, networks and work habits is likely to occur progressively with time in employment rather than instantaneously on making the transition to employment. It follows that duration effects from a previous unemployment spell – lagged duration effects – will still be present at commencement of a new unemployment spell if the elapsed time between the end of the previous spell and the start of the new spell is sufficiently short.[4] Figure 2 provides a stylised picture of potential duration and lagged duration effects that this study seeks to investigate.

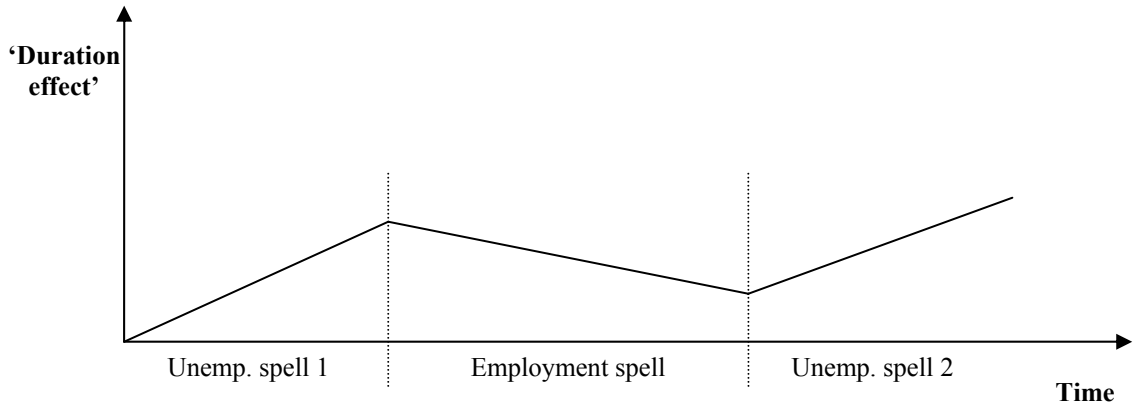
While previous research has investigated lagged duration effects, attention has focused only on the length of previous unemployment spells, for example by including realisations of durations of previous spells as regressors in models of the current spell hazard rate (Ham and Rea (1987), Coleman (1990), Lancaster (1990), Honore (1993) and Omori (1997)). None of the existing research has investigated whether and to what extent effects of previous unemployment spells dissipate over time. However, logic would dictate that at least some of the underlying reasons for the presence of lagged duration effects should diminish with time in employment. Investigation

[3] Many of the sources of duration effects are likely to be a function of non-employment rather than only unemployment. For example, atrophy of employment-specific skills is likely to occur for a non-employed person irrespective of whether that person is seeking employment. We address this issue in Section 7.

[4] Lagged duration effects on the current unemployment spell can also be conceived in terms of positive effects of employment duration. That is, longer durations in employment are associated with increases in human capital, improvements in networks and work habits, and other positive effects that are likely to decrease the probability of unemployment. Thus, a person who enters unemployment after a long employment spell may have 'positive' lagged duration effects which act to increase the probability of exiting unemployment compared with a person who enters unemployment without a recent long employment spell. In practice, negative effects of past non-employment spells and positive effects of past employment spells are, conditional on age and education, two sides of the same coin, and it does not seem possible to separately identify these two distinct effects. For expositional convenience, we therefore couch our discussion of the issue in terms of lagged duration effects deriving from spells of unemployment.

of this 'persistence' of negative duration effects is the innovative contribution of this paper – specifically, how rapidly, if at all, do lagged duration effects dissipate?

Figure 2: Stylised depiction of 'duration effects'



While the above provides a quasi-theoretical explanation for the existence of duration and lagged duration effects, it needs to be noted that, as an empirical matter, this need not translate to observed unemployment durations. Search theory posits that the probability of exit at a given duration is the net outcome of the interaction between reservation wages and the arrival of offer wages, and it is conceivable that unemployment spell duration impacts on not only the arrival of 'job offers', but also on individuals' reservation wages. Thus, for example, it is possible that while increased duration reduces the frequency of offers and the wage levels offered, it also decreases an individual's reservation wage such that no net effect on likelihood of exiting unemployment is evident.

4 Data

The data used in this study comprises fortnightly payment administration records over the period January 1995 to March 2003 of a 10 per cent sample of persons in Australia who at some stage in the period June 1995 to March 2003 received unemployment payments. The unemployment payments consist of NewStart Allowance (NSA), Youth Allowance (other) (YA(o)) and Youth Training Allowance (YTA). A record is generated in every fortnight in the sample period in which an individual was in receipt of an income support payment, whether or not this was an

unemployment payment.[5] In addition to administrative information on matters such as payment types and amounts received, the dataset contains limited information on personal characteristics, including sex, date of birth, social marital status, number and ages of dependent children, country of birth, indigenous status, location of residence and values of assets, earned income and unearned income.

This dataset is an extremely valuable resource. Fortnightly payment records over an eight year time span represents an exceptionally rich source of information on individuals' income support receipt. This lengthy time span delivers multiple income support spells for many individuals, including those with quite long individual spells, allowing us to investigate not only current-spell duration dependence, but also the effects of previous income support spells on current-spell duration.

While an enormously informative data source, there are limitations of the administrative dataset that require acknowledgement. As mentioned, payment records provide relatively limited information on individual characteristics – for example, educational attainment and work history are generally not available. Payments administration datasets, by their nature, also contain no information on individuals in periods in which they are not receiving payments. Particularly important for this study is that we do not know the labour force status of an individual when off payments. This feature of the data necessarily rules out a strict focus on unemployment spell duration, since many unemployed persons will, for at least part of the unemployment spell, not receive income support payments. This is because, although unemployment payments in Australia are universally available and are not time-limited, they are subject to waiting periods and family income and assets tests. Furthermore, the take up rate among those eligible is likely to be less than 100 per cent. The nature of the data therefore constrains us to examining duration of spells on income support payments of unemployed persons.

A further source of discrepancy between unemployment benefit receipt and unemployment is that, at any given point in time, not all recipients of unemployment payments are unemployed. Limited part-time work does not disqualify a recipient from eligibility for unemployment payments, and some recipients are granted temporary exemptions from job search requirements (for example, because of illness). An individual working part-time or not actively searching for work would not generally be regarded as unemployed – for example, the ABS for its Labour

[5] Records for fortnights in which only non-income support payments are received are also contained in the data set from 2001.

Force Survey defines a person to be unemployed only if that person worked less than one hour in the reference period, has actively sought work in that period and is available to start work.

The administrative data contain information on labour market earnings and the 'activity type' of NewStart Allowance recipients, allowing persons with part-time employment or an activity type not requiring job search to be identified, and therefore excluded on the basis they are not unemployed. However, it can be argued that, from the perspective of welfare policy, primary concern is with long-term receipt of income support by customers who are unemployed or sufficiently underemployed to qualify for unemployment payments. Taking this perspective, it is appropriate to focus on duration on unemployment payments. We have decided to take this perspective, on the grounds that this is most relevant to welfare policy, and the data available are most suited to consideration of welfare reliance associated with inadequate employment rather than the subtly different issue of unemployment.

A welfare policy perspective does, however, raise the question of whether receipt of payment types other than those specifically targeting the unemployed should in some circumstances be regarded as unemployment-related. Perhaps most important in this regard is the Disability Support Pension (DSP). Gregory and Cai (2003) argue there has been substantial growth in disguised unemployment of males in the form of increased DSP receipt. It could further be argued that other income support payments to some extent also represent disguised unemployment. In our econometric estimation of models of unemployment spell duration, we in fact adopt an approach which, while focused on unemployment-related welfare receipt, does treat other income support receipt as unemployment related in certain circumstances. Full details on our approach and its motivation are provided in Section 7.

For all analysis our definition of a spell on payments is based on the *Social Security Act* (SSA) 1991 (Section 38B on 'Notional continuous period of receipt of income support payments'), which defines (for administrative purposes) a spell on income support payments to be a stay on income support in which the longest break is 6 weeks in the first 12 months of the stay on payment, and 13 weeks thereafter. For the purposes of this study, it is important that the spell definition not depend on the length of the spell. Consequently, we base our spell definition on the 6-week criterion and define a spell end to occur if a person goes off unemployment payments for three consecutive fortnights (irrespective of spell length). Correspondingly, a spell starts in a given fortnight if an individual is on income support payments in that fortnight and was off income support payments in the three preceding fortnights.

5 Empirical Hazard Functions

In this section we present prima facie descriptive evidence, in the form of empirical hazard functions, on the nature and extent of duration effects on likelihood of exiting unemployment benefit receipt. An empirical hazard function plots the probability of exiting a state (unemployment benefit receipt) at each spell duration, conditional on having reached that spell duration. That is, the hazard rate at spell duration T_k is given by:

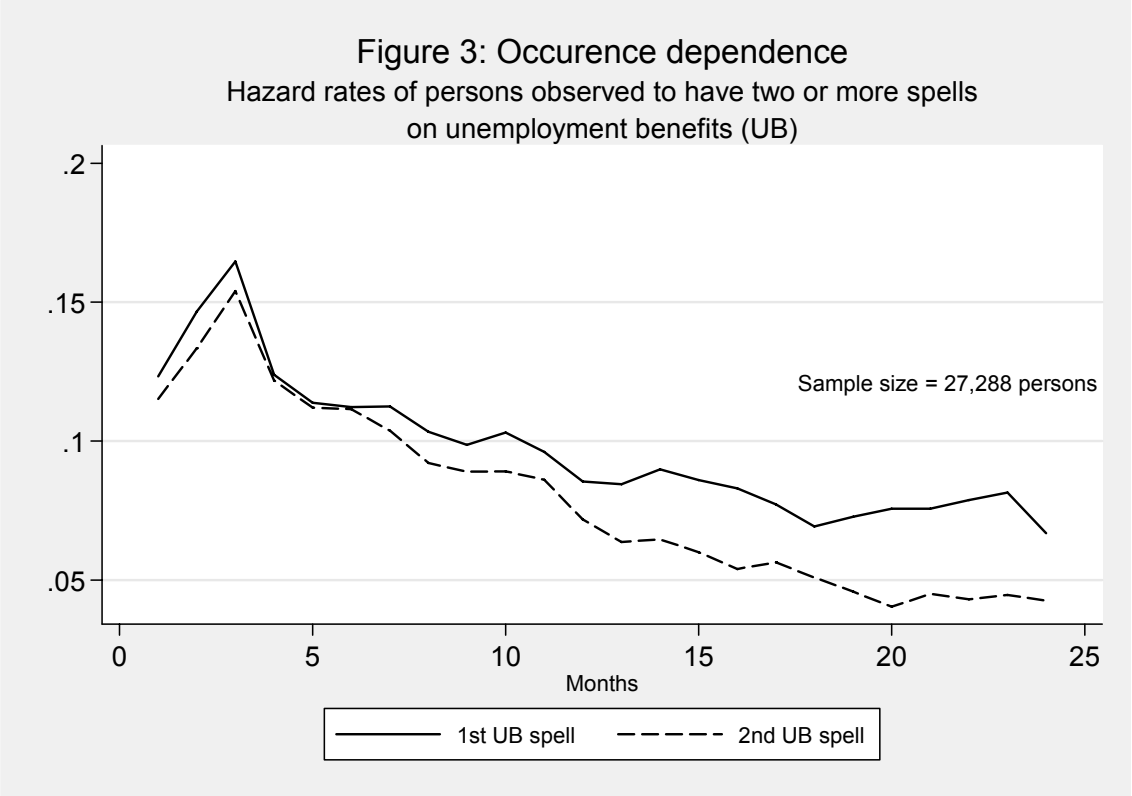
$$\lambda\left(T_k\right)=\frac{h_k}{n_k} \qquad (1)$$

where h_k is the number of spells observed completed with duration T_k and n_k is the number of spells observed to have a spell duration of at least T_k (and often referred to as the risk set, on the basis that n_k is the number of spells 'at risk' of completion at spell duration T_k).

Figures 3 to 5 present empirical hazard functions which provide preliminary indications of the extent and nature of duration dependence on the likelihood of exiting unemployment payments. The fortnightly periodicity of the data means that the empirical hazard functions are obtained by calculating the hazard at fortnightly intervals, whereby the hazard for fortnight *k* is the proportion of spells reaching duration *k* that are observed completed at duration *k*. All the empirical hazards are restricted to persons who commenced a spell on unemployment payments in 1997 or 1998, did not receive any income support payments in the two years preceding commencement of that spell, and who were under the age of 55 years in January 1997.

While the sample selection rules differ across the empirical hazard functions presented in Figures 3 to 5, all give strong indications of current-spell duration effects on the likelihood of exit from unemployment payments. The hazard rate increases up to 12 weeks spell duration and thereafter decreases almost monotonically, implying a negative duration effect after 12 weeks. It should, however, be noted that a declining hazard could be driven by systematic differences in characteristics of recipients with different spell durations rather than by the effects of duration itself. Indeed, this caveat applies to all inferences that are made based on the empirical hazards, since all differences in hazards are potentially explicable by differences in characteristics. Clearly, it is not possible to resolve the existence or otherwise of duration dependence from empirical hazards. The analysis can only provide tentative indications of its likely extent and nature.

Figure 3 compares hazard rates of first and second unemployment benefit spells among those observed to have at least two spells. The hazard rate is consistently lower for the second spell, meaning the conditional probability of exit is, at each spell duration, lower in the second spell than in the first spell. This can be interpreted as evidence of 'occurrence dependence' – the fact of having had a previous spell on unemployment payments reduces the probability of exiting the current spell on unemployment payments, compared with when there is no recent history of benefit receipt. It should, however, be noted that a likely source of bias in Figure 3 is that it only compares second unemployment benefit spells with first unemployment benefit spells of those actually observed to have two spells. Persons with very long first unemployment benefit spells or with long breaks between first and second spells are not included in the sample.[6] Thus, the empirical hazard for first spells will be artificially high. (On the other hand, including all first unemployment benefit spells would suffer an alternative source of bias – the absence of second spells for those with long first spells or long breaks between first and second spells.)



[6] Persons who have only one spell are also excluded, but this is not as directly relevant to ascertaining the existence of occurrence dependence.

Figure 4 provides prima facie evidence on lagged duration dependence in the form of the impact of length of previous spells on the current spell hazard rate. It compares hazard rates of second unemployment benefit spells across three groups defined by length of first spell. A systematic ordering of hazard rates is evident for spell durations up to one year, with the hazard rate highest for those with the shortest previous spell duration and lowest for those with the longest previous duration. This is consistent with the presence of negative lagged duration dependence.

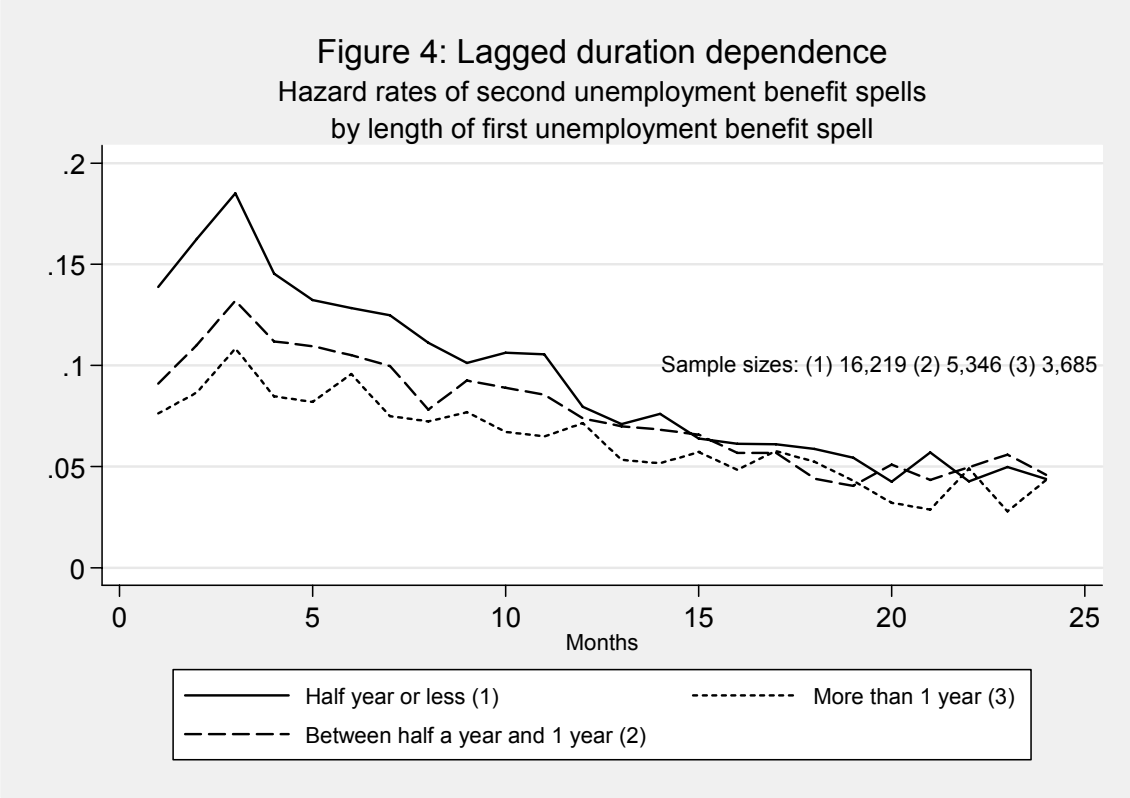
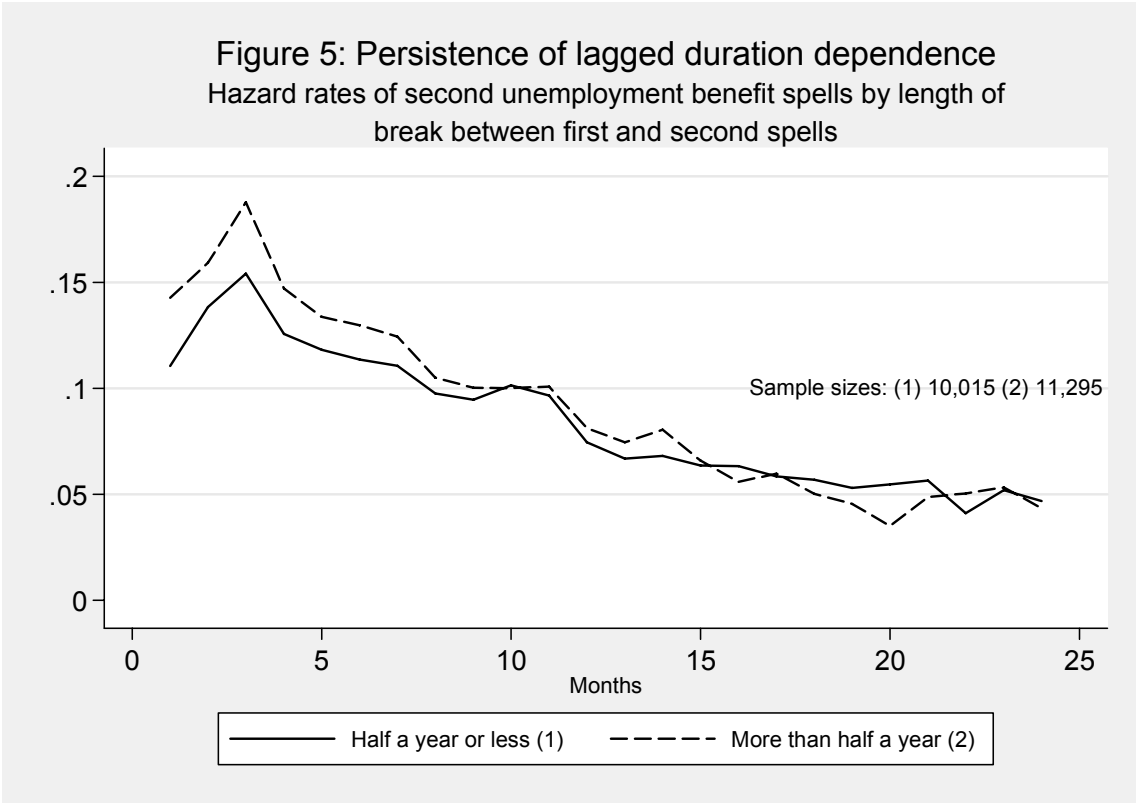


Figure 5 considers persistence of lagged duration effects, comparing second-spell hazard rates by length of break since completion of first spell. The hazards are consistent with what would be predicted if lagged duration effects do dissipate over time. Up until spell durations of approximately 15 months, the hazard rate is consistently higher for those with a break in excess of six months compared with those with a break less than six months.



6 Modelling Strategy

We employ duration analysis methods to investigate the issue of long-term income support receipt by unemployed persons, which involves estimating models of the hazard rate as described in Section 5. Thus, our models provide information on the effects of the explanatory variables on the probability of exit at each spell duration, given that spell duration has been reached. This approach maximises use of the available information on spell duration and permits analysis of individuals with multiple spells, while also handling well spells for which completed duration is unknown because they are still in progress at the end of the sample period (that is, are right-censored).

The analysis is *spell* based, since the policy issue we are addressing is 'long spells'. Thus, we are not *expressly* interested in modelling repeated spells (churning), the extent of reliance on income support, nor the 'state' a person is in (unemployed versus employed) and how it evolves over time.

We posit that the probability of exit from payments of individual *i* in period *t*, given the spell on payments has lasted to period *t*, can be expressed as:

$$P(exit)_{it} = f(x_{it}, D_t, H_{i0}, u_i) \qquad (2)$$

where $f(.)$ is an (as yet) unspecified function, x_{it} is a vector of observed characteristics of individual *i* in period t, D_t is duration of the current unemployment payments spell, H_{i0} is a vector of variables capturing history of income support receipt prior to commencement of the current spell and u_i captures the fixed effect of unobserved individual characteristics. H_{i0} captures lagged duration effects and can include dimensions such as number of previous spells, duration of previous spells and duration between completion of previous spell and commencement of current spell.

Equation (2) gives the general form of the models estimated in this paper. The hypothesis is that adverse duration effects on likelihood of exiting payments increase over time in receipt of payments and decrease over time off payments. Thus, to capture duration persistence effects (H), we employ variables reflecting both length of time off payments prior to commencement of the current spell and the length of previous spells. Clearly, identification of lagged duration effects and their persistence requires individuals with multiple spells, an issue we discuss in more detail in Section 8.

7 Sample Selection Rules

Sample

Our econometric analysis is of all income support payment receipt of males aged 25-44 years on 3rd January 1997 who commenced a spell on NewStart Allowance in 1997 or 1998 after at least two years off all income support payments.[7] To be clear on our approach, a person is selected into our sample if that person is a male who commences a spell on unemployment payments aged 25-44 years and has not received income support payments in the two years preceding spell commencement. We then examine for these individuals spell durations on *all* income support payments in the remaining sample period following the initial commencement on unemployment

[7] An important exception is that we treat Austudy and Youth Allowance (full-time education) recipients as off income support. Such income support recipients do not appear in the administrative data prior to May 1998, so consistency requires we treat them as off payments after May 1998.

payments. We are therefore examining durations on income support payments of persons who initially enter the income support system – after at least two years off all payments – as unemployment benefit recipients. Correspondingly, we interpret all income support receipt following such an unemployment benefit spell commencement as reliance on income support associated with unemployment.[8]

Clearly, our approach requires justification on two fronts: (1) the examination of spells on *all* income support payments following the initial commencement on unemployment payments, rather than, for example, only unemployment benefit spells; and (2) the somewhat restrictive sample selection criteria. Our decisions here stem from our (often competing) goals of investigating duration effects, minimising biases caused by censoring and the sample selection rules, and maximising the sample size and generalisability of our findings.

Turning first to the implications of our desire to investigate duration effects, an important issue is that duration effects are likely to be a function of non-employment rather than unemployment. This is because the factors underlying duration effects – which are conceived in terms of personal attributes relevant to the labour market – are associated with not being employed (or being severely underemployed), irrespective of whether employment is actually being sought. Thus, a person who temporarily exits unemployment because of withdrawal from the labour force, rather than movement into employment, will, on commencing a new unemployment spell, most likely have increased duration effects compared with a person who had been employed over the same period.

Examination of all income support receipt and restriction to prime age males are our two responses to this issue. Treating all income support receipt after commencement of a spell on unemployment payments as unemployment-related implies that duration effects are a function of all time on income support payments and not just a function of time on unemployment payments. In terms of the labour market dynamics that underpin the hypothesised duration effects, those duration effects associated with withdrawal from the labour force involving receipt of a non-unemployment-related income support payment are captured by this approach. Therefore, only

[8] Note also that while our motivation is to understand the causes of *long-term* reliance on income support associated with unemployment, we include spells of all lengths. The reason for this is, in essence, that it is differences in characteristics and payment receipt history between those with long spells and those with short spells that identify the drivers of long-term receipt. To give a simple example, if long-spell individuals tended to be young, we could not infer that being young puts a person at greater risk of a long spell, given commencement of a spell, without prior knowledge of the age composition of short-spell individuals.

for withdrawals from the labour force that do not involve income support receipt do we not capture duration effects.[9]

Restriction of the sample to men aged 25 to 44 years of age is then undertaken on the basis that this group has a strong attachment to the labour force. Persons in this group who exit unemployment payments and do not go on to another income support payment are more likely to go to employment than are other persons, for whom such exits are relatively more likely to involve withdrawal from the labour force. For example, young people may go into full-time education (and reside with parents), older people may retire early and draw on superannuation funds and prime-age women may partner with employed males. Restricting to males aged 25-44 years also partially addresses the problem that lumping together employment and non-participation may lead to incorrect inference concerning the transition to work if the determinants of transitions to employment and non-participation differ (Flinn and Heckman, 1983, Van den Berg, 2001).

It needs to be acknowledged that even accepting that duration effects derive from all income support receipt does not imply that the focus need be on income support receipt rather than simply unemployment benefit receipt. It is in principle possible to model duration on unemployment payments and include explanatory variables for past durations on all income support payments. There are two interrelated reasons for instead modelling duration on all income support payments. First, transitions from unemployment payments to other income support payments are conceptually distinct from transitions off all payments. From a labour market perspective, given the restriction to males aged 25-44 years, the former can be interpreted as a transition from unemployment to non-participation, while the latter can be interpreted as a transition from unemployment to employment. It is the latter type of transition that is of primary interest, and treating the former type as equivalent (that is, as an exit from unemployment) will lead to potentially incorrect inferences concerning the transition to work. An alternative approach would be to take a 'competing risk' modelling approach, which distinguishes transitions off all payments from transitions to other payments, but it is not clear how to implement this approach in a multiple-spell context with lagged duration effects.

[9] For practical reasons in relation to model estimation, we assume all payment types have the same lagged duration effects associated with them and that lagged duration effects do not depend on whether part-time employment is held. We furthermore necessarily assume that the evaporation of duration effects occurs whenever not on income support and at the same rate irrespective of actual activity while not on income support (that is, whether or not employed). This is because no information is available on individuals when not on payments.

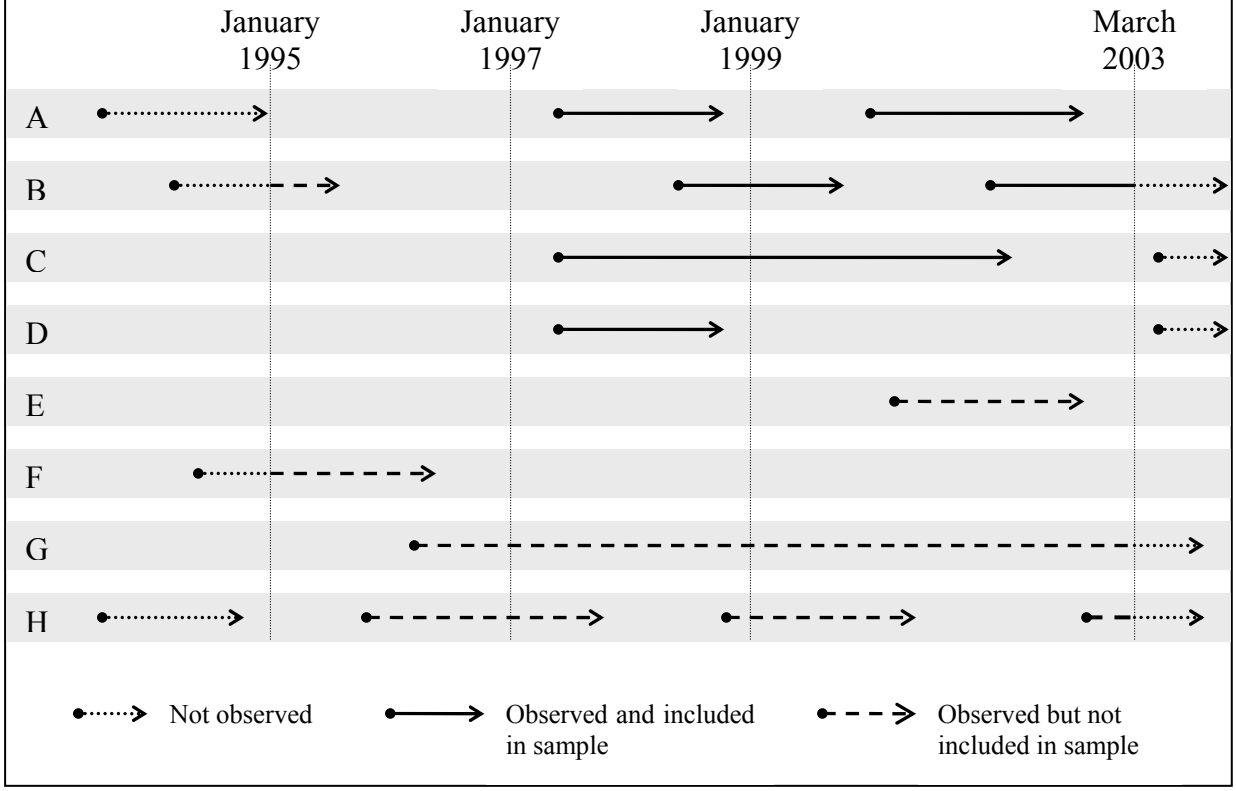
A second reason for our approach is that, from a welfare policy perspective, duration on income support by unemployed or very underemployed persons is what is of concern, rather than simply duration on unemployment payments. It is of course debatable whether it is appropriate to interpret receipt of income support by individuals who receive other income support payments subsequent to receipt of unemployment payments as *unemployment* related. However, given that for males aged 25-44 years much of this will involve receipt of DSP (Tseng et al, 2005), this interpretation cannot be regarded as entirely unreasonable (Gregory and Cai, 2003). Nonetheless, as a sensitivity check, estimates obtained when we restrict the analysis to spells on unemployment payments are reported in an appendix.

Aside from the restriction to males aged 25-44 years, the other main sample selection restrictions concern the timing of spell commencements and break in payments prior to first observed spell on unemployment payments. These sample selection rules are determined as the net outcome of trade-offs in relation to biases from various sources as well as the desire to maximise both the sample size and the potential to identify duration effects (for example, by allowing for the possibility that lagged duration effects are long-lived).

Figure 6 provides a diagrammatic depiction of our sample selection rules in terms of timing of spells, presenting income support receipt patterns for eight hypothetical individuals.[10] Only individuals A to D have spells on income support that enter our sample. Person A is the prototypical case, with no income support receipt between January 1995 and January 1997, and with the individual completing two spells between January 1997 and March 2003, the first commencing between January 1997 and January 1999. Such a case is valuable because individuals with two or more spells are required in order to identify lagged duration effects and their persistence. That is, no lagged duration effects can exist in our estimated models unless individuals are observed to have more than one income support spell. Thus, while persons C and D contribute observations to our sample, they do not directly contribute to identifying lagged duration effects. The last four cases present individuals who, despite receiving unemployment benefits in the sample period, do not enter our sample. Note, in particular, that our sample selection rules exclude the *very* long-term unemployed (Person G) and 'chronic churners' (Person H).

[10] Assume for convenience that all spells are unemployment benefit spells.

Figure 6: Sample selection rules for income support spells



The post-1996 restriction of the starting date of the window in which the first unemployment benefit spell must commence is imposed in order to provide a two-year minimum payment history, which is required to ensure no income support payments were received in the two years prior to commencement of that spell. Underpinning this decision is an assumption that lagged duration effects persist for up to two years. For example, in Figure 6, person H's first observed spell commenced between January 1995 and January 1997. This spell cannot be included if lagged duration effects are assumed to persist for up to two years, because the values of all variables capturing such lagged duration would not be known (such as length of previous spell and length of break between current spell and previous spell).

Clearly, the requirement of at least two years off all payments prior to commencement of first unemployment benefit spell is arbitrary. Ideally, we would allow duration effects to be long-lived (longer than two years), but there are two factors that cause us to constrain ourselves to a two year limit. First, as the required break is increased, those who churn are increasingly excluded from being able to enter the sample, never having a break sufficiently long to qualify for entry into the sample. This has the potential to introduce or increase bias resulting from the

exclusion of persons without sufficiently long payment breaks (although, it should be noted, there is no a priori reason to believe this to be the case). A second practical constraint is that the limited time-span of the data (eight years) needs to be taken into account. The longer the required break, the shorter the remaining period over which income support receipt can be examined. We have therefore adopted as a reasonable compromise two years as the assumed maximum period over which lagged duration effects operate. However, we present descriptive analysis in the following section examining the plausibility of this assumption and furthermore conduct sensitivity tests in our econometric analysis, requiring a three-year break in place of the two-year requirement.

The January 1999 cut-off for the unemployment benefit spell commencement window is imposed in order to minimise potential biases that are increasing in the span of the window in which the first unemployment benefit spell can commence. The sources of bias which are impacted by the length of this window essentially derive from right-censoring specific to multiple spell data, the nature of the problem being that censoring of spells subsequent to the first spell is not independent of the timing and duration of preceding spells (see Van Den Berg, 2001 for discussion of this issue). For example, among those who commenced their first spell towards the end of the sample period, only those with comparatively short first spells could be observed to have further spells (and it is from these further spells that lagged duration effects are identified). Including individuals starting towards the end of the sample period would create a sample of second (and higher) spells that would tend to under-represent those with longer first spells and/or longer payment breaks.

By requiring the first spell of an individual to commence by January 1999, we reduce bias due to the dependence of subsequent-spell censoring on duration and timing of earlier spells. This is because we restrict the variation across individuals in 'opportunities' to exit and return, and all individuals in our sample, even those with relatively long first spells, have a reasonable opportunity to complete a second spell. Of course, as illustrated by comparing Persons A, B, C and D in Figure 6, this source of bias is still present with our two-year window. Compared with Person A, Person B's second spell is right-censored because of a later starting date for his first included spell, Person C's second spell is not observed because of a long first spell, while Person D's second spell is not observed because of a long break between the first and second spells. Thus, the simple fact of only possessing eight years of data assures the presence of bias due to dependence of subsequent-spell censoring on duration and timing of earlier spells, irrespective of the span of the window for first spell commencements. Nonetheless, the restriction to persons

commencing an unemployment spell by the end of 1998 *reduces* the potential magnitude of bias from this source compared to the situation where the window was wider.

The restriction to males aged 25-44 years, the inclusion of all income support receipt in the period following commencement of an unemployment benefit spell and the restrictions on timing of commencement of the first observed unemployment benefit spell are all potentially controversial. In the following descriptive section, we examine the likely biases that arise from our sample selection restrictions.

Preliminary descriptive analysis

Here we provide statistics and graphs indicating the nature of the data, and at the same time provide indications of the effects and appropriateness of the sample restrictions and treatment of unemployment payments and other income support payments. Note, however, that the nature of descriptive analysis is that no conclusive evidence can be brought to bear on the appropriateness of the restrictions or the magnitude of the biases present. Thus, this section provides only *indicative* information on the reasonableness of our assumptions and the likely magnitude of biases.

Table 1 provides information on the number of unemployment benefit recipients at any one time and the duration distribution of their spells, presenting statistics for the first fortnight of July in each sample year from 1996. These 'snapshots' show the number of individuals with unemployment benefit spells in progress has declined between 1996 and 2002, with 2001 the only year in which the number of spells increased on the preceding year. Recalling that we have a 10 per cent sample, the estimates imply that 854,110 individuals were in receipt of unemployment benefits in the first fortnight of July in 1996, which had declined to 683,860 by the same stage of 2002. Among these unemployment payment recipients, approximately one-half had been on income support payment for at least one year in the current spell. The proportion that was long-term unemployed was at its highest in 1999 and 2000, possibly due to the smaller unemployment inflow associated with strong economic growth in those years and the period leading up to them.

The first column of Table 1 displays the proportion of spells that is left-censored. Left-censored spells represent those spells commencing prior to 1995, such that only the minimum duration of these spells is known – their exact duration is unknown. Around twelve per cent of unemployment recipients in July 1998 had been on income support for at least three and a half years and six per cent of unemployment payment recipients in 2002 had been on income support

for at least seven and a half years. In general, excluding these left-censored spells generates a sample selection bias due to the exclusion of individuals with (very) long spells. However, the use of a flow sampling method that selects spells commenced during a pre-specified time period (1997 and 1998) should reduce the severity of the sample selection bias. In particular, our sampling scheme will result in the inclusion of individuals who subsequently develop into long-term unemployed persons.

Table 1: Duration distribution of unemployment benefit spells in progress – First fortnight of July each year (%)

	Left-censored	> 6 months	> 12 months	> 18 months	> 24 months	> 30 months	> 36 months	Total No. of spells
1996	27.58	60.38	38.83	*27.58*	-	-	-	85,411
1997	16.79	64.18	44.58	31.09	*22.18*	*16.79*	-	83,949
1998	12.04	64.67	47.47	35.75	27.01	20.30	*15.28*	88,495
1999	10.50	68.37	53.32	42.43	34.38	27.54	21.61	78,809
2000	9.15	67.94	52.43	43.46	37.13	31.66	26.49	70,615
2001	7.01	63.77	46.59	38.00	32.22	28.04	24.79	72,322
2002	6.09	66.18	49.02	38.97	31.81	27.14	23.79	68,386

Note: Figures in *italics* are not comparable with other figures in the same column. They are lower than actual. This is because some persons not observed on income support in the first fortnight of 1995, but observed on income support from the 2nd or 3rd fortnight of 1995, will in fact be in the middle of a spell. However, all such persons have been assumed to commence the spell on income support at the date of first observed fortnight on income support – that is, from the 2nd or 3rd fortnight of 1995.

Table 2 examines the number of unemployment benefit spells commencing each year and the duration distribution of those spells. Consistent with the evidence in Table 1, the number of spell commencements in each year declined between 1996 and 2000 from 913,070 to 745,230. This was followed by an upturn in 2001, coinciding with the slight slowing of the economy in that year. Across all seven years in Table 2, approximately two-thirds to three-quarters of spells commenced were completed within twelve months. Durations have tended to decline over the sample period, as evidenced by growth in the proportion of spells less than six months duration, particularly between 1996 and 1999, and reductions in the proportions of spells in each of the higher duration categories.

The second-last column of Table 2 reports the proportion of spells commencing in each that were still in progress at the end of the sample period (right-censored). Consistent with expectations, this proportion tends to be higher the later the year of commencement. Somewhat surprisingly, however, the increase is very slight between 1996 and 1999, reflecting a trend towards shorter spell durations over this period. As discussed earlier in this section, our econometric analysis is

of all income support receipt of those who commenced an unemployment benefit spell in 1997-98. Thus, of those included in our sample, approximately 8 per cent are not observed to complete their first income support spell. To the extent that duration and lagged duration effects differ for members of this group compared with those with shorter first spells, for whom we observe subsequent income support spells, this is a source of potential bias. That this represents 8 per cent of individuals entering our sample provides an indication of the significance of this issue – it is important, but not critical.

Table 2: Unemployment benefit and other income support spells by year of commencement – Number of spells and duration distribution (%)

Year	≤ 6 months	6-12 months	12-18 months	18-24 months	24-30 months	30-36 months	36 + months	Right-censored	Total Spells
				Unemployment payments					
1995	47.83	20.29	8.97	5.40	2.94	1.60	12.96	7.11	75,288
1996	48.22	18.48	9.27	4.63	2.76	2.08	14.56	8.37	91,307
1997	51.20	17.17	7.89	4.74	3.23	2.29	13.47	8.48	81,812
1998	53.94	18.12	7.87	4.41	2.64	1.78	11.24	8.36	80,083
1999	58.16	17.13	6.70	3.54	2.14	1.47	10.85	9.61	79,093
2000	58.46	15.77	6.53	3.68	*1.88*	*0.52*	*0.01*	13.13	74,523
2001	57.53	16.43	*5.93*	*1.35*	*0.02*	*0*	*0*	18.74	78,635
				Other income support payments					
1995	36.60	14.40	8.48	6.22	4.49	3.03	26.82	14.32	11,215
1996	39.18	14.16	8.12	5.53	3.83	2.94	26.21	14.91	9,470
1997	40.99	13.77	7.57	5.64	3.89	2.80	25.34	16.53	9,349
1998	40.19	14.48	7.15	5.70	3.63	2.60	26.24	20.50	9,418
1999	38.96	14.07	7.72	4.75	3.72	2.73	2.80	25.27	10,301
2000	36.90	15.01	7.94	5.12	*3.41*	*0.95*	*0.02*	30.65	12,042
2001	37.85	14.32	*6.95*	*1.87*	*0.03*	*0*	*0*	38.98	11,991

Notes: A spell is defined as an unemployment benefit spell if the individual commenced the spell on unemployment payments; otherwise it is an 'other income support payments' spell. Figures in *italics* are not comparable to the corresponding figures of earlier years because of right-censoring. Specifically, there were spells commenced in 2000 that were still in progress at the end of the sample period (right-censored) with durations as low as 27 months, and spells commenced in 2001 that were right-censored with durations as low as 15 months.

Table 2 also replicates the information presented for unemployment benefit spells for other income support payment spells observed for our sample (which, recall, is a ten per cent sample of persons who received *unemployment payments* at some stage of the sample period). This group tends to have longer spell durations and correspondingly higher rates of right-censoring. Including individuals whose first spell is on other income support payments would therefore worsen the sample selection bias deriving from right-censoring, since for a larger proportion of

our sample our observation period would not be long enough to observe second spells. In any case, as indicated earlier, individuals who commenced a spell on other income support payments are more likely to have not been employed in the period leading up to their first observed income support spell, implying measures of lagged duration effects will be downwardly biased for these individuals.

In Table 3, the distribution of the length of *breaks* between income support spells is examined for unemployment payment spells and other income support payment spells ending in each year. Across all years, over 44 per cent of unemployment payment spell ends and over 48 per cent of other income support payment spell ends are followed by re-entry to income support within 12 months. Exits from unemployment payment spells tend to be followed by longer breaks than exits from other income support payments. Indeed, the estimates for 1995 exits indicate that over 22 per cent of individuals who exit unemployment payments do not return to income support payments within seven years of spell end, compared with 3 per cent of those exiting other income support payments. Table 3 also shows that the break length has tended to increase over the sample period. For individuals exiting unemployment payments in 1995, around 51 percent re-entered income support receipt within one year, compared with 44 per cent for those who exited in 2001. Corresponding figures for exits from other income support payments are 61 per cent in 1995 and 48 per cent in 2001.

Important for our analysis is that the majority of individuals – more than 85 per cent of those exiting unemployment payments and 79 per cent of those exiting other income support payments – either re-enter within 2 years or do not return at all within seven years of the spell end. This suggests that our choice of two years as the payment history observation window will cover most of the cases of re-entry.

Table 3: Distribution of length of break between income support spells by year of commencement of break (%)

	≤ 6 months	6-12 months	12-18 months	18-24 months	24-30 months	30-36 months	36 + months	Did not return	Total Spells
				Spells concluded on unemployment payments					
1995	32.04	19.10	6.78	4.63	3.15	2.42	*9.44*	22.44	83,155
1996	28.81	18.41	7.46	4.82	3.23	2.67	*9.20*	25.40	85,766
1997	30.09	15.59	7.35	4.83	3.22	2.67	*8.36*	27.90	80,542
1998	27.69	14.25	7.73	5.19	3.96	3.20	*6.32*	31.66	73,512
1999	28.02	14.96	7.93	5.70	3.77	2.70	*2.79*	34.13	77,730
2000	29.83	15.92	7.92	5.00	*3.05*	*1.39*	*0.09*	36.80	73,719
2001	29.67	14.48	*6.50*	*2.45*	*0.16*	*0*	*0*	46.73	72,877
				Spells concluded on other income support payments					
1995	42.91	17.69	8.88	6.01	4.33	3.57	*13.50*	3.13	9,057
1996	38.39	17.18	9.21	6.29	4.54	3.17	*12.4*	8.85	7,794
1997	34.30	16.98	9.00	6.23	4.19	3.50	*11.20*	14.56	8,552
1998	32.67	16.21	9.38	6.47	4.36	3.96	*7.55*	19.39	8,791
1999	33.66	15.91	9.35	5.98	4.26	3.31	*3.11*	24.42	9,512
2000	33.51	15.9	8.34	5.18	*3.21*	*1.42*	*0.07*	32.38	9,657
2001	33.38	14.61	*6.81*	*2.43*	*0.07*	*0*	*0*	42.70	10,035

Notes: 'Spells concluded on unemployment payments' refers to completed income support payment spells in which the payment type immediately prior to completion of the spell was an unemployment payment; 'spells concluded on other income support payments' refers to all other completed income support spells. Figures in *italics* are not comparable to the corresponding figures of earlier years because of right-censoring. That is, some individuals will return to income support payments in the time period indicated by the column heading, but are necessarily recorded as not returning because this did not occur before the end of the sample period (and was therefore not observed).

Table 4 presents descriptive information on income support receipt behaviour following commencement of an income support spell in 1997-98, for both males aged 25-44 and all persons.[11] It compares patterns across four groups: those who commenced a spell on unemployment payments after at least two years off all income support payments (our estimation sample); those who commenced a spell on other income support payment after at least two years off all income support payments; those who commenced a spell on unemployment benefits after a break of less than two years; and those who commenced a spell on other income support payments after a break of less than two years. Given that the entire sample at our disposal is ten per cent of persons who received unemployment payments in the period January 1995 to March 2003, this provides an indication of the differences in income support receipt patterns of our selected sample from excluded groups of persons who received unemployment payments in the sample period.

[11] These statistics are presented by sex and age group in Table A2 in the appendix.

In general, those who commenced on unemployment payments in 1997-98 tend to have shorter spells than those who commenced on other income support payments, and also have a lower rate of right-censoring. Irrespective of payment type (unemployment or other income support payment), those who received income support within the two years preceding spell commencement tend to have longer spells than those who did not receive any income support payments in that period. However, a notable difference between those who commenced on unemployment benefits and those who commenced on other income support payments is that, for the former group, a recent history of income support receipt is associated with a larger number of subsequent income support spells; whereas there is no such pattern evident for those who commenced on other income support payments.

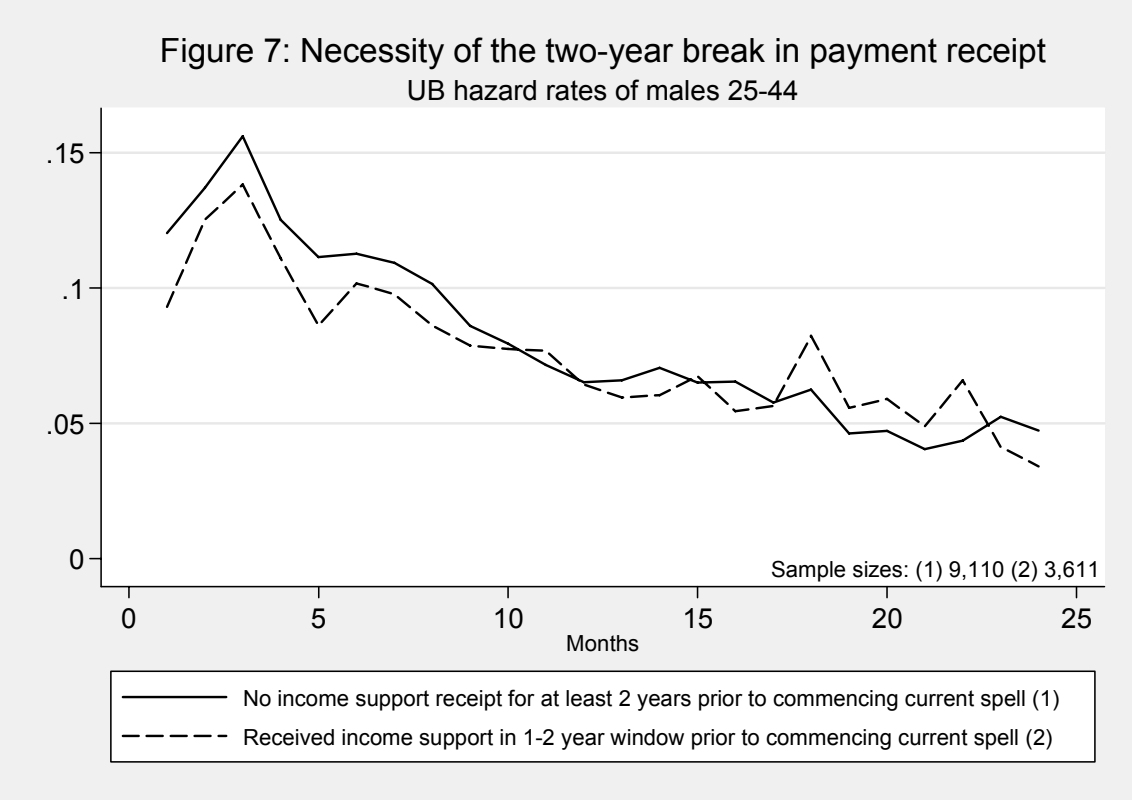
Table 4: Persons commencing an income support spell in 1997-98 – Subsequent income support receipt patterns, by type of spell commencement

	No. people	Mean duration of complete spells	Mean duration of right-censored spells	Proportion of spells right-censored (%)	Mean no. of UB spells	Mean no. of all IS spells	Median no. of UB spells	Median no. all IS spells	Max no. UB spells	Max no. all IS spells
All persons										
UB 1	73,460	27.88	136.50	8.65	1.884	2.005	1	2	10	12
Other 1	5,999	42.71	134.35	15.39	0.805	2.171	1	2	9	10
UB 2	56,407	34.86	140.99	9.41	2.255	2.438	2	2	16	16
Other 2	9,051	51.65	138.15	21.04	0.546	2.128	0	2	8	12
Males 25-44										
UB 1	17,685	24.04	135.26	4.85	1.824	1.933	1	2	10	10
Other 1	1606	32.74	136.80	9.46	0.928	2.233	1	2	6	8
UB 2	19,908	33.61	140.78	7.91	2.309	2.482	2	2	16	16
Other 2	2031	37.84	138.05	12.75	0.821	2.276	0	2	8	12

UB 1: Started on unemployment payments with no income support receipt in the preceding two years.
Other 1: Started on other income support payment with no income support receipt in the preceding two years.
UB 2: Started on unemployment payments and had some income support receipt in the preceding two years.
Other 2: Started on other income support payment and had some income support receipt in the preceding two years.
Note: Durations are measured in fortnights.

Focusing specifically on males aged 25-44 years, it is notable that very few individuals commence on income support payments other than unemployment benefits. Furthermore, among those who commence on unemployment benefits, the mean number of unemployment benefit spells is very close to the mean number of all income support spells, implying that few subsequently receive other income support payments. Importantly for this study, this is evidence supportive of strong attachment to the labour market of this group.

The significant differences in subsequent patterns of receipt between 'clean starts' on unemployment benefits and 'clean starts' on other income support payments suggests that the two groups are likely to be quite different in their characteristics. In particular, it is probable that they had very different work histories in the two-year period leading up to the spell commencement, despite both being off all income support payments. This therefore adds weight to our decision to restrict the sample to individuals who commenced on unemployment payments. A final point to note from Table 4 is that differences in patterns of receipt subsequent to first spell commencement in 1997-98 between those with a recent history of income support receipt and those with no such history are highly suggestive of previous experience of income support receipt being an important factor affecting current spell duration.

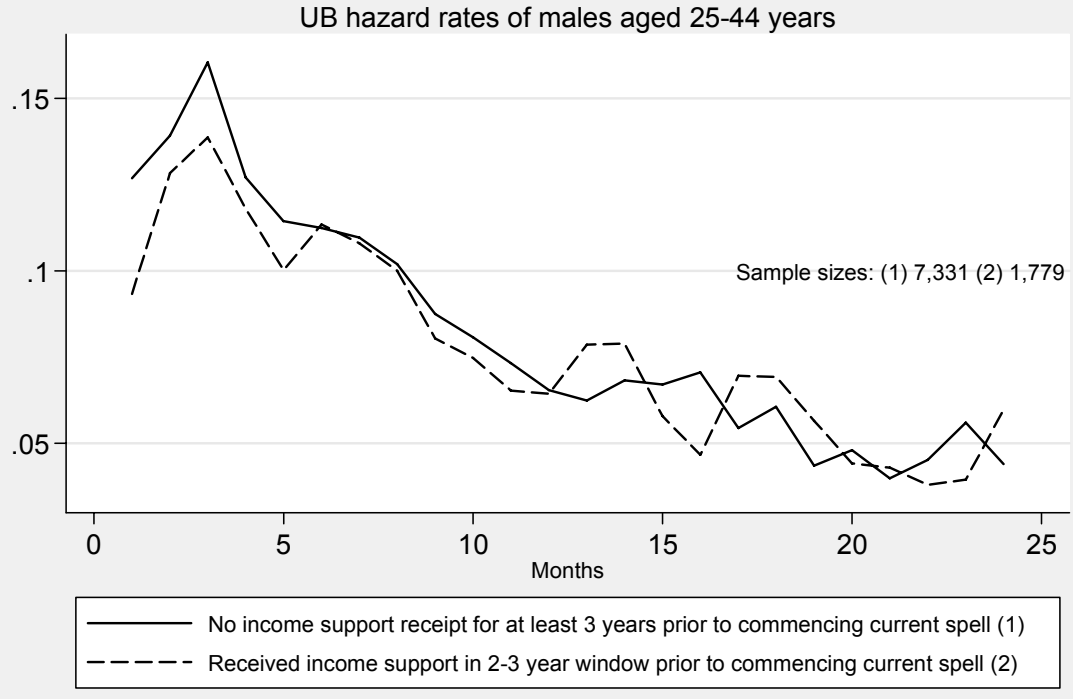


Figures 7 and 8 consider the appropriateness of the two-year payment break requirement prior to first unemployment benefit spell. Figure 7 presents empirical hazard functions of unemployment benefit spells, comparing the hazard function for those with at least two years off all payments prior to spell commencement with the hazard function for those with between one and two years off all payments prior to spell commencement. The hazard with a two-year break is considerably

higher than the hazard with a 1-2 year break up until approximately 10 months spell duration. This suggests a one-year break is not sufficient and, at a minimum, a two-year break is required.

To examine whether a two-year break is sufficient, Figure 8 compares the hazard function for those with a payment break of at least three years with the hazard function for those with a payment break of between two and three years. The figure suggests that the two-year break may not be sufficient, since the hazard is noticeably higher up to six months spell duration for those with no income support receipt in the three years prior to spell commencement. Of course, ideally, we would like to have the payment history observation window as long as possible. The longer this window, the better we are able to ensure duration effects are absent at commencement of the first spell, and the greater the flexibility we gain in modelling lagged duration effects. However, increasing the payment history window is at the cost of increasing the number of right-censored cases and reducing the opportunity of observing individuals' subsequent spells. Consequently, we retain the two-year break as our definition of a 'clean start' in our main analysis. However, based on the results presented in Figure 8, we conduct sensitivity tests by estimating our econometric models with a requirement of a three-year payment break. For these models, we can only select spells that commenced after 1998, which leaves us with only a five-year maximum observation period for analysis of income support receipt behaviour.

Figure 8: Sufficiency of the two-year break in payment receipt



8 Model estimation

Estimating equation

There is a range of possible approaches to estimation of models of the hazard rate. We employ the mixed proportional hazards model with a piecewise linear baseline hazard. This model was chosen for its flexibility and capacity to identify current-spell duration effects without imposing functional form assumptions on the nature of these effects. The estimating equation is the discrete-time counterpart to the underlying continuous-time proportional hazards model, and is given by:

$$h_j(X_{ij}) = 1 - \exp\{-\exp[X_{ij}\beta + D\gamma]\} \qquad (3)$$

where X_{ij} is a vector of observed characteristics, β is a vector of parameters to be estimated, and D a set of dummies variable that represent duration since spell commencement. The vector X_{ij} will contain variables designed to capture lagged duration effects as well as variables for socio-demographic and other individual characteristics. While perhaps obvious, it is important to note that lagged duration effects can only be identified in the presence of multiple-spell data, since variation in variables for lagged duration effects only occurs across recipients who actually have a recent history of receipt. In essence, lagged duration effects are identified by variation in durations for the one individual – that is, we require 'variation in spell durations within individuals.'

In addition to estimating models based on Equation (3), we also estimate models allowing for unobserved individual heterogeneity, estimating a mixed proportional hazards model with Gamma distributed unobserved heterogeneity:

$$h_j(X_{ij}) = 1 - \exp\{-\exp[X_{ij}\beta + D_j\gamma + \log(e_i)]\} \qquad (4)$$

where e_i is a Gamma distributed random variate with unit mean and variance equal to σ^2.

Estimation of Equations (3) and (4) is via maximum likelihood methods. Define a censoring indicator $c_i = 1$ if person i's spell duration is completed, and $c_i = 0$ if i's spell duration is censored. The log likelihood function to be maximised can then be written as:

$$\log L = \sum_{i=1}^{N} \log[(1-c_i)A_i + c_i(B_i)] \text{ , where}$$

$$A_i = \left[1 + v\sum_{j=1}^{t_i}[\exp(X_{ij}\beta + D_j\gamma)]\right]^{-(1/v)} \text{ , and} \qquad (5)$$

$$B_i = \begin{cases} \left[1 + v\sum_{j=1}^{t_i-1}\exp(X_{ij}\beta + D_j\gamma)\right]^{-(1/v)} & \text{if } t_i > 1 \\ 1 - A_i \quad \text{if } t_i = 1 \end{cases}$$

The log-likelihood function of the model without individual unobserved heterogeneity is the limiting case as $v \to 0$. [12] Unobserved heterogeneity refers to characteristics of individuals that affect their likelihood of exiting income support receipt that are unobserved and which differ across individuals. Models estimated based on Equation (4) control for this source of variation in exit probabilities on the assumption that it has a Gamma distribution across spells.

Two important issues arise from our use of multiple-spell data (that is, where some individuals contribute more than one spell) that remain unresolved. First is that, by assuming unobserved heterogeneity is randomly distributed (following a Gamma distribution) across *all* spells, we necessarily assume an individual's unobserved characteristics in one spell are uncorrelated with that individual's unobserved characteristics in another spell. This assumption is clearly going to be violated. Models estimated which allow for unobserved heterogeneity should take account of dependency in unobserved heterogeneity between different spells of the same individual. Failure to do so may (or may not) lead to biased estimates.

The second potential problem deriving from the use of multiple-spell data is the implicit assumption of exogeneity of censoring of spells subsequent to the first spell. Figure 6 shows that, given our data structure, the longer the first spell, the lower the probability of observing subsequent spells, and the higher the probability of subsequent spells being right-censored. Moreover, the length of breaks between spells will also affect the probability of subsequent-spell censoring. Thus, the assumed exogeneity of second (and subsequent) spell censoring is clearly false. This also may or may not be a source of bias in our estimates.

[12] The model is estimated using the Stata program written by S.P. Jenkins.

To our knowledge, no existing literature documents methods that can simultaneously solve both the dependence of unobserved heterogeneity between spells for the same individual and the problem of endogeneity of spells subsequent to the first spell. While there are estimators available that address, or partially address, the former *or* the latter issue, all have important weaknesses in the context of this study.[13] We therefore retain our adopted approach and leave as important caveats these two potential sources of bias – bias which, it should be emphasised, is of uncertain magnitude and direction (and which *could* be zero).[14]

Duration variables

The duration variables included in the models estimated aim to capture both current-spell duration effects and lagged duration effects, with the latter in turn depending on both the length of the previous spell and the length of the break between the previous spell and the current spell. Motivated by the desire to identify the nature and magnitude of duration effects and their persistence, our approach is broadly non-parametric in order to avoid inferences that are simply artefacts of assumed functional forms.

For current-spell duration, we employ spell duration dummy variables. However, because hazard rate modelling can suffer from volatility in hazards which drive spurious inferences, we estimate models in which the baseline hazard, while non-parametric, is allowed to vary only across pre-specified intervals that are longer than the periodicity of the data (which is fortnightly). To be precise: for the first 24 weeks of spell duration, the baseline hazard is constrained to change only at 4-week intervals; for weeks 24 to 48 of spell duration it can change only at 12-week intervals; for weeks 48 to 72 it can change only at 24-week intervals; and for spell durations in excess of

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[13] The problem of dependence of unobserved heterogeneity between spells can potentially be addressed by employing 'fixed effects' or 'random effects' models, both of which assume individual heterogeneity is fixed over time (see, for example, Van den Berg, 2001). However, both types of model are problematic in our context. A fixed effects model uses multiple-spell data to *estimate* and thereby perfectly control for all unobserved individual fixed effects, but requires at least two spells for each individual. This approach therefore requires exclusion of all individuals with only one spell, which is likely to introduce new biases. A random effects model, rather than *estimating* the unobserved fixed effect for each individual, assumes unobserved heterogeneity follows a random distribution. These models are able to fix effects across spells for the one individual, but still retain individuals with single spells. However, random effects models require the assumption that unobserved heterogeneity is uncorrelated with the explanatory variables, *including lagged duration variables*. Furthermore, the assumed exogeneity of censoring of all spells is particularly important to the identification of random effects models. With regard to the issue of endogenous censoring, Woutersen (2000) has developed Generalised Method of Moments (GMM) type estimators that deal with endogenous censoring and endogenous regressors. However, these estimators require at least two spells for each individual and, in any case, still do not successfully take into account the endogeneity of the appearance of the second spell. These estimators have also yet to be applied in the empirical literature.

[14] Needless to say, future research developing of an estimator that could simultaneously address both unobserved fixed effects and endogenous censoring would be very valuable for examination of issues of the kind considered by this study.

72 weeks the baseline hazard is assumed constant. This is known as a piecewise linear specification.

For lagged duration effects, we take two approaches, estimating separate specifications for each approach. In the first approach we employ dummy variables for length of previous spell and length of break between previous spell and current spell. The previous spell length dummies are for the length of the spell immediately preceding the current spell, which must have concluded within two years of commencement of the current spell to qualify. Both sets of dummies (for previous spell length and break length) are for three-month duration intervals up to a maximum of 24 months. A further category of 'in excess of 24 months' is included for previous spell length.

Figure 2 suggests that lagged duration effects present in the current spell should be the net product of both previous spell length and the length of the break. That is, the effects associated with a given previous spell length will depend on the length of the break following that spell, and conversely, the effects associated with a given break prior to commencement of the current spell will depend on the length of the previous spell. Therefore, for our second approach to examining lagged duration effects, we employ interactions between the length of the previous spell and the length of the break between the previous spell and the current spell. The 'cost' of investigating these interactions is that we need to reduce the number of previous spell lengths and break lengths that we distinguish in order to achieve model convergence.[15]

For the second approach, we distinguish three previous-spell lengths and six break lengths, resulting in eighteen dummy variables to capture lagged duration effects. Specifically, previous spell length is distinguished by whether it is shorter than six months, between six and twelve months or longer than twelve months; while the length of the break between the previous and current spells is distinguished by three-month interval up to 12 months, and by six-month interval from 12 to 24 months.

Implicit in our choice of lagged duration variables is that lagged duration effects do not persist beyond two years and that it is only the length of the spell immediately preceding the current spell that impacts on the probability of exit. However, we do also include dummy variables for

[15] The non-interacted version therefore retains importance for providing more precise delineation between effects associated with different previous spell lengths and break lengths and for providing guidance on the categories to be used for the specification with interactions.

whether the current spell is the third or fourth observed spell for the individual in order to (crudely) capture potential lagged duration effects from earlier spells.

Other explanatory variables

We include a number of variables for individual characteristics that could potentially impact on exit from income support receipt, many of which are time-varying. Full details of all the explanatory variables are provided in the appendix (Table A7). Note that, while our aim is to capture all relevant characteristics available in the data, a key criterion in the process of explanatory variable selection/creation is parsimony. This is an important issue for models which allow unobserved individual heterogeneity, since these models are computationally intensive and estimation can potentially take many months when using such large datasets as used for this study. Thus, for example, we do not include dummy variables for labour force statistical region, because this would require an additional 64 variables.

Socio-demographic characteristics for which we include variables comprise age, country of birth and ethnicity, housing circumstances (renting, owner-occupier, etc.) and family circumstances (presence of a partner, dependent children, etc.). To attempt to capture the extent of the individual's engagement with the labour market while on income support, we include a set of variables for within-spell earnings, whether the individual is in receipt of unemployment benefits and, for those on unemployment benefits, the "activity type" of the individual. A dummy variable is also included for whether the individual was known to be in full-time study in the break preceding the current spell, based on whether a study-related income support payment was received in the break. It can be interpreted as capturing duration effects associated with studying (as opposed to working full-time). This variable is only available for spells subsequent to the first spell because study-related payments are only available in the administrative dataset from 1998.

In addition to the above individual characteristics, the contemporaneous local unemployment rate is added as a proxy for the labour demand conditions faced by the recipient. We also include a variable for the local unemployment rate at the time of *commencement* of the spell. This is based on findings by Omori (1997) that the unemployment rate at the commencement of an individual's unemployment spell is an important determinant of subsequent likelihood of exit from unemployment. In light of the inclusion of this variable, we decided not to include variables for the stage of the year at which the income support spell commenced, on the basis that the

variable for the unemployment rate at spell commencement should capture relevant effects in this regard.

Sample characteristics

Table 5 present summary statistics of sample characteristics for income support spells commenced on unemployment benefits in 1997-98, with statistics presented separately for groups defined by completed duration of spell. In addition to producing statistics for males aged 25-44, we also present them for all persons aged 15-64 years. This provides indicative information on how the selected sample differs from the population of persons who commenced an unemployment benefit spell in 1997-98 more generally. Among other things, this is of value for interpreting the results obtained for males aged 25-44 years, including understanding limitations on generalising inferences to the broader population.[16]

Considering first all unemployment benefit spells commenced in 1997-98, we see that most spells are less than one year – and in fact most are less than six months duration – although there are significant numbers of spells in each duration category presented. With regard to the sample characteristics, while correlations between characteristics and spell duration are in general somewhat difficult to succinctly summarise, several patterns are clear. Those with shorter spells are generally more likely to be younger, be Australian-born, be single and have been engaged in full-time study in the period immediately preceding the spell. Furthermore, the mean proportion of time with low or no job search requirements and the unemployment rate at the start of the spell tend to be higher for those with longer spells.

[16] For the interested reader, statistics are also presented by all sex and age groups in Table A3 in the appendix. Also reported in the appendix (Table A4) are characteristics by spell number, including details of previous spell lengths and break lengths.

Table 5: Characteristics by completed duration of income support spell – Persons commencing on unemployment benefits in 1997-98

	< 6 months	6-12 months	12-18 months	18-24 months	24-36 months	36-48 months	48 + months	All
All persons								
No. of persons	41,528	12,034	5,144	2,828	2,944	1,388	7,176	73,042
Age 15-19	29.89	26.87	27.62	24.58	24.01	23.70	17.34	27.44
Age 20-24	23.16	21.06	18.97	17.40	16.95	15.56	6.26	20.24
Age 25-34	22.95	21.92	22.20	22.67	21.67	20.97	10.37	21.39
Age 35-44	12.82	14.07	15.65	16.69	17.39	17.44	12.33	13.60
Age 45-54	8.38	10.93	11.98	13.51	14.67	15.27	21.70	10.94
Age 55-64	2.80	5.15	3.58	5.16	5.30	7.06	31.95	6.38
Male	61.65	63.30	63.88	64.75	64.13	63.33	59.06	62.08
Australian-born	77.69	75.70	72.86	71.64	70.01	71.11	67.75	75.38
ESC	8.56	8.28	8.40	7.25	7.91	8.21	8.93	8.46
NESC	13.49	15.76	18.37	20.69	21.64	19.96	23.02	15.87
ATSI	0.26	0.26	0.37	0.42	0.44	0.72	0.29	0.29
Partner on IS	14.81	18.70	18.92	21.89	21.09	23.13	33.99	18.31
Partner not on IS	7.95	7.25	7.19	7.25	7.64	7.56	10.62	8.00
Single	77.24	74.05	73.89	70.86	71.26	69.31	55.39	73.69
Home owner	33.45	36.45	36.39	37.13	35.26	36.46	48.73	35.93
Private rent	41.80	44.27	45.20	44.55	45.69	44.24	33.51	41.94
Government rent	0.90	1.12	1.75	2.09	2.65	2.09	2.65	1.31
Other living	23.84	18.16	16.66	16.23	16.41	17.22	15.11	20.82
Have child(ren)	11.01	11.62	11.99	13.65	13.18	11.38	8.81	11.16
Previous study	6.05	3.85	3.54	2.83	2.21	2.45	1.45	4.71
Have earned income	20.39	22.05	19.28	19.50	20.47	19.71	39.24	22.40
Earnings when positive ($)	32.70	37.59	34.06	38.50	39.41	36.39	51.27	37.86
Local unemp - start	8.50	8.76	8.93	8.93	8.94	8.99	8.94	8.66
NSA with no search	3.06	4.66	5.13	5.69	6.50	6.03	7.20	4.17
NSA with low search	1.40	5.91	10.41	13.47	17.45	19.53	11.62	5.24
Males 25-44								
No. of persons	10,132	3,038	1,375	773	841	375	1,059	17,593
Australian-born	69.67	69.32	64.80	61.97	61.36	61.87	66.10	68.11
ESC	11.69	9.22	10.11	9.44	8.80	10.13	8.31	10.66
NESC	18.44	21.23	24.65	28.20	29.49	27.20	25.40	20.97
ATSI	0.21	0.23	0.44	0.39	0.36	0.80	0.19	0.26
Partner on IS	32.40	34.27	34.04	35.71	35.08	32.00	32.77	33.14
Partner not on IS	14.98	11.22	9.96	8.93	11.18	9.33	9.25	13.03
Single	52.62	54.51	56.00	55.37	53.75	58.67	57.98	53.83
Home owner	34.43	32.46	32.58	31.95	29.85	32.00	35.03	33.60
Private rent	47.41	50.49	51.85	50.97	51.37	48.27	47.40	48.66
Government rent	1.64	2.01	2.62	3.36	4.88	4.00	3.49	2.17
Other living	16.52	15.04	12.95	13.71	13.91	15.73	14.07	15.57
Have child(ren)	34.08	33.21	32.73	35.32	34.60	28.53	30.41	33.56
Previous study	0.81	1.05	0.80	0.52	0.36	0.53	0.19	0.77
Have earned income	27.78	27.02	25.48	20.90	21.19	18.25	21.46	26.27
Earnings when positive ($)	34.19	33.40	30.23	33.64	32.46	38.98	48.50	34.76
Local unemp - start	8.46	8.69	8.82	8.82	8.95	8.91	9.03	8.61
NSA with no search	3.15	5.22	5.07	7.38	7.69	8.59	11.97	4.71
NSA with low search	1.00	3.96	7.20	11.13	17.22	21.43	18.24	4.69

Note: All reported values are proportions (%), except values for 'No. of persons' and 'Earnings when positive'. 'Have earned income' is proportion of the spell in which earnings were reported.

Males aged 25-44 years are somewhat different from the general population. No doubt reflecting their age composition, they tend to have fewer very long spells (because of the absence of older

persons), are less likely to be single (because of the absence of young persons), are more likely to have dependent children and are less likely to have engaged in full-time study in the period immediately preceding the spell. They are also more likely to be foreign-born, which may also partially derive from an age composition effect. Significantly, for this group, a distinct pattern of a declining mean probability of having earned income as spell duration increases is evident. It is likely that the spike in this probability for those with income support spell durations in excess of four years that is evident for all persons (it rises from 20 per cent for those with spells of 3-4 years to 34 per cent for those with longer spell durations) is driven by both females and older males who transferred from NewStart Allowance to other income support payments.

9 Results of econometric analysis

Core estimation results are presented in Tables 6, which contains coefficient estimates for the models with and without unobserved heterogeneity.[17] Table 6a presents estimates for the specification of lagged duration effects that does not permit interactions between previous spell length and break length, while Table 6b presents the estimates for the approach where such interactions are included. The models with Gamma distributed unobserved heterogeneity produce coefficient estimates very similar to the models which do not allow for unobserved heterogeneity. All of the following discussion of the results therefore applies to both models.[18]

We consider first the roles played by individual characteristics other than those manifesting as duration effects. For most of these variables, coefficient estimates are very similar across both models. Consistent with the descriptive statistics presented in Table 5, the models imply the hazard is decreasing in age. Thus, the older the age of entry into unemployment benefits, the greater the risk of a long-term spell on income support. All else equal, immigrants from English-speaking countries have significantly higher hazard rates than both the Australian-born, who in turn have significantly higher hazard rates than immigrants from non-English speaking countries. Having a partner who is not on income support is associated with a substantially higher hazard rate than being single or, indeed, having a partner who is on income support, which may to some

[17] Tables A5 and A6 in the appendix contain results of sensitivity tests, namely, restricting to unemployment payments only and imposing a three-year break requirement. Somewhat reassuringly, inferences are generally not sensitive to these variations.

[18] This insensitivity is likely to reflect the inclusion of payment history variables, which means our payment history variables may in part be capturing effects of unobserved characteristics. Of course, from a policy-formulation perspective, this is not necessarily problematic. If payment history is a good predictor of unobserved characteristics, it is valuable to policy targeting.

extent reflect reduced incentives for exiting income support receipt in such circumstances. Residing in public housing is associated with a significantly lower hazard rate, which may also reflect reduced incentives for exiting income support receipt for such people because of rental payments are determined as a set proportion of income (at least over a substantial range of incomes).

Table 6a: Coefficient estimates for hazard models without interacted lagged duration effects

	Model without unobserved heterogeneity		Model with Gamma distributed unobserved heterogeneity	
	Coefficient	*Std. Error*	*Coefficient*	*Std. Error*
Age 30-34	-0.097**	0.0173	-0.095**	0.0174
Age 35-39	-0.164**	0.0181	-0.163**	0.0182
Age 40 plus	-0.275**	0.0184	-0.275**	0.0185
ESC	0.103**	0.0187	0.101**	0.0188
NESC	-0.097**	0.0151	-0.094**	0.0151
Aboriginal or Torres Strait Isl.	-0.102	0.1066	-0.105	0.1071
Partner on IS benefits	-0.010	0.0187	-0.011	0.0188
Partner not on IS benefits	0.536**	0.0221	0.536**	0.0222
Home owner	0.064**	0.0142	0.061**	0.0143
Other living circumstances	0.105**	0.0169	0.105**	0.0170
Government rent	-0.225**	0.0359	-0.228**	0.0361
Child(ren) indicator	-0.007	0.0188	-0.013	0.0188
Local unemp - start	-0.002	0.0033	-0.003	0.0033
Local unemp - current	-0.036**	0.0035	-0.036**	0.0035
F-T study in previous IS break	-0.130**	0.0438	-0.133**	0.0439
Currently has earned income	0.083	0.0548	0.089	0.0549
Proportion of spell (to date) with earnings	0.007	0.0562	0.002	0.0563
Mean earnings when positive (to date)	1.56E-04	0.0001	1.74E-04	0.0002
Currently on UB	0.933**	0.0276	0.930**	0.0277
NSA with low search	-0.359**	0.0218	-0.360**	0.0219
NSA with no search	-1.220**	0.0352	-1.217**	0.0353
Currently in 3rd IS spell	0.064**	0.0207	0.067**	0.0207
Currently in 4th or greater IS spell	0.097**	0.0258	0.099**	0.0258
Month 1	-3.374**	0.0405	-3.385**	0.0407
Month 2	-3.087**	0.0401	-3.098**	0.0403
Month 3	-2.929**	0.0401	-2.937**	0.0403
Month 4	-3.183**	0.0417	-3.190**	0.0419
Month 5	-3.281**	0.0430	-3.288**	0.0431
Month 6	-3.301**	0.0438	-3.305**	0.0440
Month 7	-3.352**	0.0450	-3.360**	0.0453
Month 8	-3.436**	0.0467	-3.438**	0.0469
Month 9	-3.555**	0.0489	-3.558**	0.0491
Month 10	-3.439**	0.0488	-3.438**	0.0490
Month 11	-3.524**	0.0510	-3.529**	0.0513
Month 12	-3.659**	0.0542	-3.661**	0.0545
Month 13-15	-3.736**	0.0447	-3.737**	0.0450
Month 16-18	-3.844**	0.0477	-3.847**	0.0479
Month 19-21	-3.978**	0.0517	-3.980**	0.0520
Month 22-24	-4.015**	0.0550	-4.013**	0.0552
Month 25-30	-4.139**	0.0503	-4.139**	0.0506
Month 31-36	-4.178**	0.0555	-4.180**	0.0558
Month 37 plus	-4.584**	0.0475	-4.582**	0.0479

Notes: ** indicates significance at 5% level. * indicates significance at 10% level.

Table 6a continued: Coefficient estimates for hazard models without interacted lagged duration effects

	Model without unobserved heterogeneity		Model with Gamma distributed unobserved heterogeneity	
	Coefficient	*Std. Error*	*Coefficient*	*Std. Error*
Previous spell 3-6	-0.064**	0.0244	-0.063**	0.0244
Previous spell 6-9	-0.203**	0.0295	-0.203**	0.0295
Previous spell 9-12	-0.245**	0.0355	-0.244**	0.0354
Previous spell 12-15	-0.307**	0.0446	-0.307**	0.0446
Previous spell 15-18	-0.336**	0.0522	-0.338**	0.0522
Previous spell 18-21	-0.307**	0.0629	-0.314**	0.0630
Previous spell 21-24	-0.524**	0.0582	-0.524**	0.0581
Previous spell 24+	-0.563**	0.0486	-0.562**	0.0486
Break <3	0.093**	0.0258	0.104**	0.0259
Break 3-6	0.137**	0.0243	0.147**	0.0244
Break 6-9	0.209**	0.0286	0.220**	0.0286
Break 9-12	0.246**	0.0315	0.256**	0.0315
Break 12-15	0.228**	0.0364	0.239**	0.0364
Break 15-18	0.229**	0.0426	0.241**	0.0427
Break 18-21	0.257**	0.0442	0.269**	0.0442
Break 21-24	0.255**	0.0396	0.266**	0.0397
Sample size	701,561			
Log likelihood	-117,767.38		-117,067.95	

Notes: ** indicates significance at 5% level. * indicates significance at 10% level.

Variables capturing the level of engagement with the labour market in terms of payment type and activity types are all statistically significant and of expected sign. The indicator variable for whether the individual is currently on NewStart Allowance has a large positive coefficient, while the variables indicating the extent of administrative job search requirements have coefficient estimates decreasing as requirements decrease. Interestingly, earnings while on income support do not appear to affect the hazard rate, with none of the three variables for earnings statistically significant.

The estimates imply that demand conditions faced by the individual do impact on the likelihood of exit from income support receipt, with the contemporaneous local unemployment rate significantly impacting on the hazard rate in a negative fashion. However, in contrast to findings by Omori (1997), there is no evidence of an independent effect of the unemployment rate at the time of commencement of the income support spell.

The dummy variables for current spell duration are also very similar across both models. The estimates imply positive duration dependence up to three months spell duration and a general pattern of negative duration dependence thereafter – that is, the predicted hazard is increasing in spell duration up to three months and generally decreasing in duration thereafter. The only

exception is a slight increase in the hazard at the duration indicated by the '10 months' variable – which is in fact at the 37-40 week duration, coinciding with the nine-month review process for NewStart Allowance recipients. This notwithstanding, it is clear that after twelve weeks spell duration, increased spell duration of itself decreases the likelihood of exit from income support.

Tables 6a and 6b differ with respect to the variables included to capture lagged duration effects. They do, however, both have two indicator variables for whether the current spell is the third income support spell or the fourth or higher income support spell observed in the sample period. Coefficient estimates for these two variables are very similar across the two specifications, with being in the third observed spell associated with a significant increase in the hazard rate, and being in the fourth or higher spell associated with an even higher hazard. These results suggest that these variables are capturing a predisposition towards churning.

Table 6a, containing distinct sets of variables for previous spell duration and length of break between that spell and the current spell, provides clear evidence on roles for both sets of variables in affecting current-spell likelihood of exit. Holding all else constant, a prior income support spell ending within two years of commencement of the current spell decreases the hazard rate, and this effect is greater the longer that previous spell. That is, the predicted hazard is almost monotonically decreasing in previous spell length. With respect to break length, the results imply that the predicted hazard rate is increasing in break length up to approximately twelve months. Breaks longer than twelve months are, on average, not associated with significantly different hazard rates from breaks of 9-12 months. The inference we can draw from this is that lagged duration effects do not appear to persist beyond nine months. Conversely, if the break since the previous spell is less than nine months, an individual is, all else equal, at greater risk of a long-term spell on income support. Put another way, once the period elapsed since the last spell exceeds 9 months, length of break provides no additional information on risk of long-term income support receipt.

In Table 6b, we address the concern that the specification reported in Table 6a does not allow for lagged duration effects to be the net outcome of interactions between previous spell length and break length. For example, longer previous spell lengths are associated with larger lagged duration effects, yet in Table 6a we are necessarily constraining the reduction in the lagged duration effects associated with each break length to be the same irrespective of previous spell length.

Table 6b: Coefficient estimates for hazard models with interacted lagged duration effects

	Model without unobserved heterogeneity		Model with Gamma distributed unobserved heterogeneity	
	Coefficient	*Std. Error*	*Coefficient*	*Std. Error*
Age 30-34	-0.099**	0.0173	-0.098**	0.0174
Age 35-39	-0.167**	0.0181	-0.166**	0.0182
Age 40 plus	-0.279**	0.0184	-0.279**	0.0184
ESC	0.103**	0.0187	0.101**	0.0188
NESC	-0.097**	0.0151	-0.095**	0.0151
Aboriginal or Torres Strait Isl.	-0.105	0.1066	-0.108	0.1071
Partner on IS benefits	-0.014	0.0187	-0.015	0.0187
Partner not on IS benefits	0.534**	0.0221	0.534**	0.0222
Home owner	0.063**	0.0142	0.060**	0.0143
Other living circumstances	0.105**	0.0169	0.105**	0.0170
Government rent	-0.227**	0.0359	-0.230**	0.0361
Child(ren) indicator	-0.001	0.0187	-0.008	0.0188
Local unemp - start	-0.002	0.0033	-0.002	0.0033
Local unemp - current	-0.036**	0.0035	-0.036**	0.0035
F-T study in previous IS break	-0.133**	0.0437	-0.136**	0.0439
Currently has earned income	0.083	0.0548	0.088	0.0550
Proportion of spell (to date) with earnings	0.009	0.0562	0.005	0.0564
Mean earnings when positive (to date)	1.51E-04	0.0001	0.000	0.0002
Currently on UB	0.944**	0.0275	0.941**	0.0276
NSA with low search	-0.364**	0.0218	-0.364**	0.0219
NSA with no search	-1.221**	0.0352	-1.218**	0.0353
Currently in 3rd IS spell	0.068**	0.0207	0.071**	0.0207
Currently in 4th or greater IS spell	0.106**	0.0257	0.108**	0.0257
Month 1	-3.387**	0.0405	-3.397**	0.0406
Month 2	-3.099**	0.0400	-3.110**	0.0401
Month 3	-2.941**	0.0401	-2.949**	0.0402
Month 4	-3.196**	0.0417	-3.202**	0.0418
Month 5	-3.294**	0.0429	-3.300**	0.0430
Month 6	-3.313**	0.0438	-3.318**	0.0439
Month 7	-3.365**	0.0450	-3.373**	0.0451
Month 8	-3.449**	0.0466	-3.451**	0.0467
Month 9	-3.568**	0.0489	-3.570**	0.0490
Month 10	-3.451**	0.0488	-3.450**	0.0488
Month 11	-3.536**	0.0510	-3.541**	0.0512
Month 12	-3.672**	0.0542	-3.673**	0.0543
Month 13-15	-3.748**	0.0447	-3.749**	0.0448
Month 16-18	-3.856**	0.0476	-3.858**	0.0478
Month 19-21	-3.989**	0.0517	-3.991**	0.0519
Month 22-24	-4.026**	0.0549	-4.023**	0.0551
Month 25-30	-4.149**	0.0502	-4.148**	0.0504
Month 31-36	-4.185**	0.0555	-4.186**	0.0557
Month 37 plus	-4.589**	0.0475	-4.586**	0.0477

Notes: ** indicates significance at 5% level. * indicates significance at 10% level.

Table 6b continued: Coefficient estimates for hazard models with interacted lagged duration effects

	Model without unobserved heterogeneity		Model with Gamma distributed unobserved heterogeneity	
	Coefficient	*Std. Error*	*Coefficient*	*Std. Error*
Previous spell < 6, Break 0-3	0.050*	0.0280	0.062**	0.0280
Previous spell < 6, Break 3-6	0.107**	0.0256	0.118**	0.0256
Previous spell < 6, Break 6-9	0.175**	0.0314	0.186**	0.0314
Previous spell < 6, Break 9-12	0.207**	0.0352	0.218**	0.0352
Previous spell < 6, Break 12-18	0.239**	0.0335	0.250**	0.0335
Previous spell < 6, Break 18-24	0.245**	0.0358	0.258**	0.0358
Previous spell 6-12, Break 0-3	-0.122**	0.0466	-0.111**	0.0465
Previous spell 6-12, Break 3-6	-0.130**	0.0411	-0.120**	0.0411
Previous spell 6-12, Break 6-9	-0.007	0.0512	0.004	0.0512
Previous spell 6-12, Break 9-12	0.006	0.0662	0.018	0.0662
Previous spell 6-12, Break 12-18	-0.090	0.0567	-0.078	0.0567
Previous spell 6-12, Break 18-24	0.061	0.0618	0.073	0.0618
Previous spell 12+, Break 0-3	-0.323**	0.0488	-0.312**	0.0488
Previous spell 12+, Break 3-6	-0.251**	0.0476	-0.243**	0.0477
Previous spell 12+, Break 6-9	-0.224**	0.0625	-0.216**	0.0626
Previous spell 12+, Break 9-12	-0.132*	0.0732	-0.120	0.0731
Previous spell 12+, Break 12-18	-0.231**	0.0662	-0.219**	0.0662
Previous spell 12+, Break 18-24	-0.275**	0.0708	-0.268**	0.0709
Sample size	701,561		701,561	
Log likelihood	-117,777.07		-117,076.81	

Notes: ** indicates significance at 5% level. * indicates significance at 10% level.

Differences in lagged duration-break profiles do in fact arise by previous spell length. For short previous spells (less than six months), the predicted hazard is actually higher than if no income support payments were received in the preceding two years. Nonetheless, the hazard is increasing in break length, consistent with evaporation of lagged duration effects. Intermediate previous spell lengths are associated with significantly lower hazard rates when the spell ends within six months of commencement of the current spell. Lagged duration effects for such spells appear not to persist beyond six months, with coefficient estimates showing that after a break of six or months, no significant differences in the hazard rate exist compared with a person with no recent income support receipt. For previous spells longer than twelve months, there is evidence of both some evaporation of lagged duration effects and some permanent scarring. The hazard is increasing in break length up to 9-12 months, but is still significantly lower than in the absence of the previous spell even after an 18-24 month break in payments.

Figures 9 and 10 provide a graphical illustration of the nature and extent of the lagged duration effects implied by the coefficient estimates in Table 6a (unobserved heterogeneity model). Figure 9 presents predicted hazard functions for four alternative previous spell lengths compared

with the case of no recent history of income support receipt.[19] It shows that the coefficient estimates translate to substantial differences in likelihood of exit at each spell duration. For example, an individual with a previous spell in excess of two years duration has, all else equal, a conditional probability of exit at 5 months spell duration of 4 per cent, compared with almost 7 per cent for an individual with no recent history of income support receipt. To put this result in context, an individual with no recent history of receipt would (all else equal) require a current-spell duration of 16 months before that individual's hazard rate had fallen to the hazard rate at 5 months spell duration of an individual with a previous spell in excess of two years. That is, at the five-month current-spell duration, the negative lagged duration effect associated with a two-year previous spell is equivalent to the negative duration effects deriving from a further 11 months of current-spell duration.

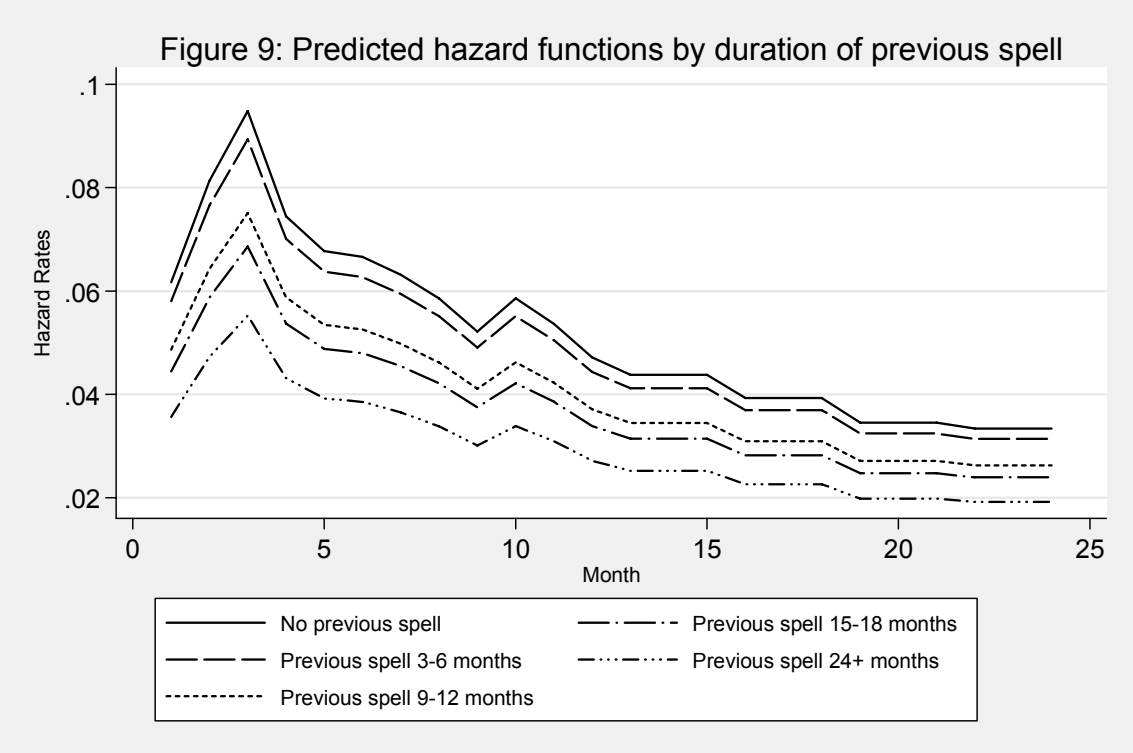
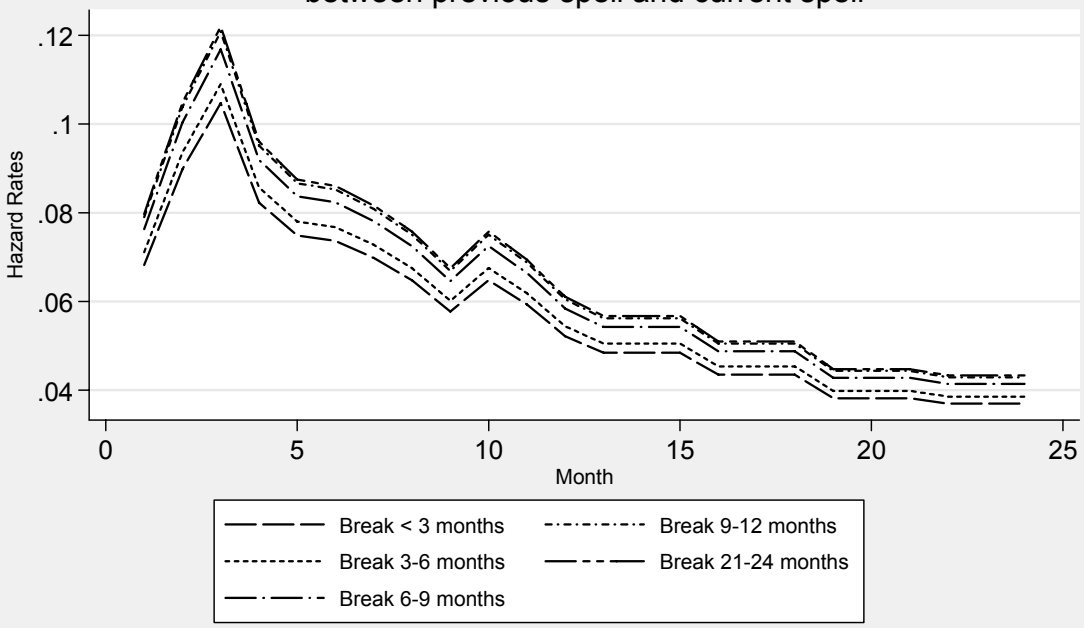


Figure 10 presents similar information to Figure 9, but with predicted hazards distinguished by length of break between the preceding spell and the current spell. This gives average effects of break lengths averaged over (observed) previous spell lengths. As discussed above, on average,

[19] All other dummy variables are set equal to zero and continuous variables are held constant at mean values.

the predicted hazard is increasing in break length up to the 6-9 months break length, with break lengths over 9 months (on average) not associated with any differences in predicted hazards. The differences between the hazards by break length, while of sizeable magnitude, are not as great as the differences by previous spell length. This may in part be due to long-term or permanent effects of previous spell length that do not evaporate, at least within two years.

Figure 10: Predicted hazard functions by length of break between previous spell and current spell



10 Conclusion

In addition to identifying observable socio-demographic characteristics associated with increased risk of long-term income support receipt associated with unemployment, this study has found important roles for duration effects from both the current spell and the preceding spell on income support. First, there is substantial negative duration dependence evident from approximately 12 weeks spell duration and above. This means that, holding all else constant, increased duration on income support beyond 12 weeks, by reducing the conditional likelihood of exit, of itself increases the risk of long-term receipt.

Second, we find sizeable negative lagged duration effects associated with previous spells on income support. The risk of a long-term spell on income support appears to be broadly

monotonically increasing in the length of the income support spell immediately preceding it. There is also evidence that this risk is decreasing in the length of the break between that spell and the current spell, although increases in breaks beyond nine months are generally not associated with any further decrease in risk.

Important differences in the role of break length by length of previous spell are also evident. Substantial negative effects are found for previous spells in excess of 12 months duration which, while decreasing in the length of the break for breaks up to 9-12 months, remain substantial even after a two-year break. Thus, there is evidence of a permanent scarring effect of long-term income support receipt. For intermediate previous spell lengths of between 6 and 12 months, negative effects are confined to those that ended within 6 months of commencement of the current spell. That is, spells of 6-12 months that ended more than 6 months prior to the start of the current spell appear to be *irrelevant* to the rate of exit from the current spell. For previous spells less than 6 months, there is a *positive* lagged duration effect, which is also increasing in break length up to approximately 12 months.

A caveat to our findings that must be acknowledged is that our model estimation has not been able to adequately address correlation in unobserved heterogeneity between spells for the same individual, nor the endogeneity of spells subsequent to the first. Some of our inferences may be to be sensitive to controlling for these factors. For example, we suspect that the high exit rate for those with short previous spells is driven by those with a predisposition towards churning – an unobserved characteristic our model estimation has not been able to capture. Controlling for this may show the apparent positive effect of a short previous spell to be spurious. Developing an estimator that can account for unobserved individual fixed effects and endogeneity of spells subsequent to the first spell would therefore be a valuable further contribution to the examination of lagged duration effects.

These issues notwithstanding, the findings of this study clearly have value to policy makers. The message is that information on previous income support receipt should be a factor in determining appropriate policy interventions with respect to individuals entering unemployment benefit receipt. Holding all else constant, a long-term spell ending within the last two years puts an individual entering benefit receipt at a much elevated risk of another long-term spell on income support; while a spell of between 6 and 12 months ending within the last 6 months also elevates this risk.

As it currently operates, the *Active Participation Model*, which prescribes delivery of employment services for unemployment payment recipients, does not allow service delivery to (directly) depend on prior income support receipt. Under this model, employment services are generally only a function of current-spell duration and assessed relative labour market disadvantage at the time of spell commencement, as measured by the Job Seeker Classification Instrument (JSCI) score. The JSCI score is based on 14 factors, information on which is derived from responses to a questionnaire issued at spell commencement. History of income support receipt is not included in these 14 factors.

The findings of this study suggest that the objective information provided by administrative records on income support receipt could be a useful addition to the calculation of the JSCI score and/or the factors determining employment services delivery under the *Active Participation Model*. For example, the estimates obtained in this study imply a new entrant with a recent previous spell in excess of two years has the same labour market disadvantage (as measured by likelihood of exit) as a recipient eighteen months into the current spell who did not have another spell on income support in the two-year period prior to commencement of that spell. Under the *Active Participation Model*, Intensive Support customised assistance is triggered by a spell duration of twelve months; yet the findings of this study would tend to suggest that entry on to NewStart Allowance within two years of exiting another spell in excess of two years should also trigger delivery of Intensive Support customised assistance.

While payment history is likely to a valuable input into the determination of employment services delivery, the relative weight given to this versus other factors – for example, those factors currently used to calculate the JSCI score – is a subject for further research. Furthermore, it is likely that for demographic groups other than males aged 25-44 years, information on employment history may be relatively more important than information on payment history. This is because non-receipt of income support is likely to be less strongly correlated with employment for these groups. Further research into the implications of employment history for subsequent risk of long-term unemployment would therefore be particularly valuable for these demographic groups.

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12 Appendix

Table A1: Proportions of spells that involve a shift between UB and other IS benefits by year spell commenced (%)

	UB to Other IS	Other IS to UB	UB no shift	Other IS no shift	Total
1995	8.60	5.52	78.43	7.44	100%
1996	9.13	3.02	81.48	6.38	100%
1997	8.78	2.57	80.97	7.68	100%
1998	8.21	2.39	81.27	8.14	100%
1999	8.37	2.38	80.11	9.14	100%
2000	7.79	3.84	78.30	10.07	100%
2001	7.36	3.23	79.41	10.00	100%
2002	4.30	3.01	81.18	11.51	100%
2003	0.76	1.42	85.19	12.63	100%

Table A2: Persons commencing an income support spell in 1997-98 – Subsequent income support receipt patterns, by type of spell commencement, sex and age group

Type of spell comm.	No. people	Mean duration of complete spells	Mean duration of right-censored spells	Proportion of spells right-censored (%)	Mean no. of UB spells	Mean no. of all IS spells	Median no. of UB spells	Median no. all IS spells	Max no. UB spells	Max no. all IS spells
Males Under 25										
UB 1	19,486	18.10	136.19	2.07	2.269	2.350	2	2	10	12
Other 1	636	20.10	126.53	5.03	1.291	2.563	1	2	9	10
UB 2	15,160	28.16	141.42	4.25	2.642	2.807	2	2	12	12
Other 2	680	27.17	136.48	8.97	1.253	2.574	1	2	8	11
Males 25-44										
UB 1	17,685	24.04	135.26	4.85	1.824	1.933	1	2	10	10
Other 1	1606	32.74	136.80	9.46	0.928	2.233	1	2	6	8
UB 2	19,908	33.61	140.78	7.91	2.309	2.482	2	2	16	16
Other 2	2031	37.84	138.05	12.75	0.821	2.276	0	2	8	12
Males 45 +										
UB 1	8,434	56.73	137.26	29.67	1.491	1.615	1	1	8	11
Other 1	718	57.23	131.87	29.81	0.657	1.894	0	2	6	8
UB 2	4,921	50.54	141.15	22.43	1.894	2.022	1	2	9	9
Other 2	1,066	76.15	138.06	43.15	0.310	1.601	0	1	5	7
Females Under 25										
UB 1	17,612	22.86	136.97	5.57	1.921	2.062	2	2	9	9
Other 1	726	39.47	133.04	13.22	0.807	2.278	0	2	6	7
UB 2	8,641	33.84	142.41	9.07	2.028	2.262	2	2	10	10
Other 2	1,650	54.80	138.14	20.97	0.284	2.139	0	2	6	8
Females 25-44										
UB 1	6,791	27.24	135.18	7.67	1.583	1.756	1	1	10	10
Other 1	1,681	49.05	134.82	14.93	0.647	2.142	0	2	7	9
UB 2	5,761	37.45	139.31	11.49	1.898	2.115	1	2	12	12
Other 2	2,785	50.97	138.58	17.06	0.479	2.201	0	2	7	10
Females 45 +										
UB 1	3,452	59.00	136.04	31.55	1.391	1.585	1	1	9	10
Other 1	632	61.19	136.70	28.16	0.587	1.888	0	2	5	10
UB 2	2,016	56.31	140.72	26.74	1.692	1.914	1	2	9	15
Other 2	839	69.88	138.02	36.11	0.347	1.815	0	1	4	9

UB 1: Started on unemployment payments with no income support receipt in the preceding two years.
Other 1: Started on other income support payment with no income support receipt in the preceding two years.
UB 2: Started on unemployment payments and had some income support receipt in the preceding two years.
Other 2: Started on other income support payment and had some income support receipt in the preceding two years.
Note: Durations are measured in fortnights.

Table A3: Characteristics by completed duration of income support spell and by sex and age group – Persons commencing on unemployment benefits in 1997-98

	< 6 months	6-12 months	12-18 months	18-24 months	24-36 months	36-48 months	48 + months	All
Males Under 25								
No. of persons	12,454	3,289	1,400	713	669	295	564	19,384
Australian-born	84.41	83.79	82.93	81.91	80.72	84.41	90.07	84.14
ESC	5.60	5.08	4.79	3.37	3.89	2.71	1.77	5.15
NESC	9.64	10.73	12.00	14.03	15.10	12.54	7.27	10.32
ATSI	0.36	0.40	0.29	0.70	0.30	0.34	0.89	0.39
Partner on IS	3.21	3.37	4.21	5.05	4.19	3.39	4.61	3.46
Partner not on IS	2.03	1.79	1.57	1.68	2.09	1.02	1.60	1.92
Single	94.76	94.83	94.21	93.27	93.72	95.59	93.79	94.62
Home owner	28.59	30.65	33.79	34.08	31.09	30.51	34.93	29.81
Private rent	40.70	44.09	44.43	44.88	47.09	45.76	36.52	41.87
Government rent	0.38	0.46	0.93	0.98	1.35	0.68	0.18	0.48
Other living	30.34	24.81	20.86	20.06	20.48	23.05	28.37	27.83
Have child(ren)	2.18	2.01	2.14	3.23	2.24	1.69	3.37	2.22
Previous study	9.07	6.26	5.43	5.33	3.89	4.75	4.61	7.82
Have earned income	9.38	7.96	6.31	4.76	5.56	4.88	5.49	8.43
Earnings when positive ($)	18.61	21.88	18.73	15.63	30.56	41.29	48.38	20.55
Local unemp - start	8.56	8.89	9.20	9.22	9.00	9.13	9.31	8.74
NSA with no search	2.01	2.63	2.43	2.99	3.14	3.17	5.27	2.33
NSA with low search	1.56	6.41	12.87	15.33	20.34	24.63	26.25	5.42
Males 25-44								
No. of persons	10,132	3,038	1,375	773	841	375	1,059	17,593
Australian-born	69.67	69.32	64.80	61.97	61.36	61.87	66.10	68.11
ESC	11.69	9.22	10.11	9.44	8.80	10.13	8.31	10.66
NESC	18.44	21.23	24.65	28.20	29.49	27.20	25.40	20.97
ATSI	0.21	0.23	0.44	0.39	0.36	0.80	0.19	0.26
Partner on IS	32.40	34.27	34.04	35.71	35.08	32.00	32.77	33.14
Partner not on IS	14.98	11.22	9.96	8.93	11.18	9.33	9.25	13.03
Single	52.62	54.51	56.00	55.37	53.75	58.67	57.98	53.83
Home owner	34.43	32.46	32.58	31.95	29.85	32.00	35.03	33.60
Private rent	47.41	50.49	51.85	50.97	51.37	48.27	47.40	48.66
Government rent	1.64	2.01	2.62	3.36	4.88	4.00	3.49	2.17
Other living	16.52	15.04	12.95	13.71	13.91	15.73	14.07	15.57
Have child(ren)	34.08	33.21	32.73	35.32	34.60	28.53	30.41	33.56
Previous study	0.81	1.05	0.80	0.52	0.36	0.53	0.19	0.77
Have earned income	27.78	27.02	25.48	20.90	21.19	18.25	21.46	26.27
Earnings when positive ($)	34.19	33.40	30.23	33.64	32.46	38.98	48.50	34.76
Local unemp - start	8.46	8.69	8.82	8.82	8.95	8.91	9.03	8.61
NSA with no search	3.15	5.22	5.07	7.38	7.69	8.59	11.97	4.71
NSA with low search	1.00	3.96	7.20	11.13	17.22	21.43	18.24	4.69

Note: All reported values are proportions (%), except values for 'No. of persons' and 'Earnings when positive'.

Table A3 continued: Characteristics by completed duration of income support spell and by sex and age group – Persons commencing on unemployment benefits in 1997-98

	< 6 months	6-12 months	12-18 months	18-24 months	24-36 months	36-48 months	48 + months	All
Males 45 +								
No. of persons	3,017	1,291	511	345	378	209	2,615	8,366
Australian-born	59.99	63.59	58.51	63.77	58.99	63.16	59.35	60.45
ESC	17.57	17.58	17.61	12.46	13.76	11.96	12.39	15.43
NESC	22.31	18.75	23.87	23.19	26.72	24.40	28.18	23.98
ATSI	0.13	0.08	0.00	0.58	0.53	0.48	0.08	0.14
Partner on IS	43.59	49.96	43.25	48.41	43.65	46.89	53.88	48.05
Partner not on IS	23.43	18.05	20.16	17.10	14.55	14.35	14.57	18.74
Single	32.98	31.99	36.59	34.49	41.80	38.76	31.55	33.21
Home owner	58.97	64.29	56.75	61.45	54.23	56.46	63.86	61.01
Private rent	25.46	24.32	29.75	25.22	34.66	28.71	23.14	25.30
Government rent	1.82	1.63	1.96	3.48	1.85	1.91	2.79	2.18
Other living	13.76	9.76	11.55	9.86	9.26	12.92	10.21	11.51
Have child(ren)	18.76	16.81	18.00	15.36	12.96	14.35	7.80	14.48
Previous study	0.23	0.31	0.39	0.29	0.53	0.96	0.08	0.24
Have earned income	48.84	57.93	47.20	48.96	49.21	46.32	63.79	54.77
Earnings when positive ($)	50.32	55.40	47.01	56.42	53.67	40.91	57.87	54.06
Local unemp - start	8.46	8.71	8.88	8.64	8.83	8.76	8.81	8.66
NSA with no search	6.74	7.99	8.98	7.18	8.92	7.13	6.16	7.01
NSA with low search	1.92	7.19	12.60	15.17	18.95	15.57	8.27	7.03
Females Under 25								
No. of persons	10,899	2,833	1,141	553	614	282	1,200	17,522
Australian-born	85.10	82.63	81.95	81.01	82.08	79.79	86.25	84.25
ESC	5.12	5.19	4.82	4.52	4.89	6.38	3.33	4.98
NESC	9.49	11.90	12.71	14.29	12.21	12.06	9.75	10.39
ATSI	0.29	0.28	0.53	0.18	0.81	1.77	0.67	0.37
Partner on IS	2.64	3.81	6.13	6.69	4.72	11.70	10.42	3.94
Partner not on IS	2.74	3.35	3.16	3.80	2.61	3.90	4.33	3.02
Single	94.61	92.83	90.71	89.51	92.67	84.40	85.25	93.04
Home owner	28.85	31.49	33.48	30.92	29.64	31.91	30.00	29.80
Private rent	40.55	47.65	45.31	47.38	45.93	47.52	44.83	42.82
Government rent	0.34	0.25	0.88	0.90	0.81	0.35	1.00	0.44
Other living	30.26	20.61	20.33	20.80	23.62	20.21	24.17	26.94
Have child(ren)	0.12	0.28	0.44	0.36	0.65	1.42	1.17	0.29
Previous study	11.29	7.02	7.10	5.97	4.72	5.67	5.33	9.43
Have earned income	10.73	8.34	5.87	6.83	5.57	5.76	5.13	9.26
Earnings when positive ($)	17.44	14.71	18.25	20.24	25.55	18.84	31.90	18.46
Local unemp - start	8.58	8.88	9.05	8.98	9.01	9.00	9.15	8.74
NSA with no search	1.98	2.91	3.11	3.41	4.80	4.23	5.11	2.60
NSA with low search	1.48	7.56	11.81	13.98	15.11	17.54	11.20	4.93

Note: All reported values are proportions (%), except values for 'No. of persons' and 'Earnings when positive'.

Table A3 continued: Characteristics by completed duration of income support spell and by sex and age group – Persons commencing on unemployment benefits in 1997-98

	< 6 months	6-12 months	12-18 months	18-24 months	24-36 months	36-48 months	48 + months	All
Females 25-44								
No. of persons	3,840	1,099	484	300	282	141	605	6,751
Australian-born	73.07	69.88	63.84	66.00	59.93	66.67	62.98	69.99
ESC	10.42	8.37	9.50	7.33	9.57	9.93	6.12	9.45
NESC	16.35	21.66	26.03	26.33	30.14	23.40	30.58	20.35
ATSI	0.16	0.09	0.62	0.33	0.35	0.00	0.33	0.21
Partner on IS	14.79	18.56	18.39	21.00	20.92	25.53	22.15	17.08
Partner not on IS	9.43	9.01	8.68	11.00	8.16	10.64	11.57	9.54
Single	75.78	72.43	72.93	68.00	70.92	63.83	66.28	73.38
Home owner	32.24	35.58	31.40	31.67	34.40	26.95	34.55	32.88
Private rent	51.85	49.68	50.83	51.67	49.65	56.74	48.60	51.13
Government rent	1.04	1.36	2.48	1.67	3.55	3.55	2.98	1.56
Other living	14.87	13.38	15.29	15.00	12.41	12.77	13.88	14.43
Have child(ren)	6.04	7.64	7.64	9.67	8.16	5.67	9.59	6.98
Previous study	1.61	1.91	2.07	1.33	1.42	0.00	1.16	1.60
Have earned income	32.20	29.83	27.08	23.15	30.39	25.99	24.47	30.15
Earnings when positive ($)	29.29	33.49	37.72	35.56	40.57	27.66	33.25	31.69
Local unemp - start	8.24	8.35	8.38	8.82	8.55	8.90	8.77	8.37
NSA with no search	4.52	7.20	7.75	6.98	9.83	8.12	8.97	5.99
NSA with low search	1.24	4.50	8.78	12.65	15.61	16.00	10.69	4.57
Females 45+								
No. of persons	1,186	484	233	144	160	86	1,133	3,426
Australian-born	67.54	65.70	65.67	67.36	68.13	63.95	60.55	64.77
ESC	15.68	17.15	15.02	12.50	15.00	12.79	12.53	14.57
NESC	16.69	16.94	19.31	20.14	16.88	23.26	26.74	20.55
ATSI	0.08	0.21	0.00	0.00	0.00	0.00	0.18	0.12
Partner on IS	24.87	29.13	28.33	27.78	28.13	27.91	35.13	29.45
Partner not on IS	13.83	9.50	12.88	7.64	14.38	12.79	13.42	12.76
Single	61.30	61.36	58.80	64.58	57.50	59.30	51.46	57.79
Home owner	57.59	57.64	54.51	56.94	59.38	58.14	60.90	58.55
Private rent	25.89	27.69	32.19	29.17	28.13	27.91	22.95	25.89
Government rent	2.53	3.31	3.86	2.78	3.75	2.33	4.32	3.39
Other living	14.00	11.36	9.44	11.11	8.75	11.63	11.83	12.17
Have child(ren)	2.95	2.89	1.29	4.17	3.75	4.65	1.32	2.42
Previous study	0.17	0.21	0.86	0.00	0.63	0.00	0.26	0.26
Have earned income	51.16	53.59	48.81	55.47	50.88	47.74	59.98	54.34
Earnings when positive ($)	47.22	45.05	39.20	37.08	34.66	37.49	45.12	44.34
Local unemp - start	8.30	8.61	8.74	8.92	9.24	9.47	8.81	8.64
NSA with no search	8.99	10.41	17.73	12.52	9.17	4.55	7.38	9.30
NSA with low search	1.49	4.96	6.36	12.48	15.23	15.65	6.82	5.53

Note: All reported values are proportions (%), except values for 'No. of persons' and 'Earnings when positive'. 'Have earned income' is the proportion of the spell earnings were reported.

Table A4: Characteristics of spells in model estimation sample, by spell number

	1st Spell	2nd Spell	3rd Spell	4th Spell	Spells 5+
Mean duration (fortnights)	18.29	14.70	12.69	11.02	9.40
Proportion right-censored	4.80	12.10	18.47	26.00	28.79
Proportion start on UB	100.00	88.87	87.54	88.40	87.47
Age 25-29	27.34	16.92	11.09	7.48	3.72
Age 30-34	26.45	29.03	32.25	36.23	37.24
Age 35-39	24.17	25.47	26.61	26.11	25.16
Age 40 +	22.04	28.57	30.04	30.18	33.88
Australian born (non-ATSI)	68.17	68.37	69.37	70.64	72.57
ESC	10.66	10.86	11.37	11.82	13.26
NESC	20.91	20.41	18.82	17.43	13.99
ATSI	0.26	0.36	0.44	0.11	0.18
Home owner	33.67	26.48	25.61	23.64	25.34
Private rent	48.57	53.83	56.31	59.37	57.86
Government rent	2.16	2.96	3.36	3.68	3.63
Other living circumstances	15.60	16.73	14.71	13.30	13.17
Have child(ren)	33.58	29.95	23.29	15.34	9.08
Did some study in previous break from IS	0	4.09	3.18	2.75	1.45
Previous spell < 6, Break 0-3	0	8.87	10.90	13.52	19.44
Previous spell < 6, Break 3-6	0	10.68	14.18	17.10	22.16
Previous spell < 6, Break 6-9	0	6.49	8.70	12.26	12.62
Previous spell < 6, Break 9-12	0	5.28	7.05	8.47	8.17
Previous spell < 6, Break 12-18	0	6.30	7.84	8.08	7.72
Previous spell < 6, Break 18-24	0	6.20	6.84	5.17	4.72
Previous spell 6-12, Break 0-3	0	2.86	4.36	5.17	4.00
Previous spell 6-12, Break 3-6	0	3.98	4.94	6.16	6.63
Previous spell 6-12, Break 6-9	0	2.34	3.27	3.52	3.63
Previous spell 6-12, Break 9-12	0	1.56	2.18	1.26	0.91
Previous spell 6-12, Break 12-18	0	2.59	2.34	2.42	0.73
Previous spell 6-12, Break 18-24	0	2.26	2.16	1.54	0.45
Previous spell 12+, Break 0-3	0	4.23	3.11	2.97	2.82
Previous spell 12+, Break 3-6	0	4.43	4.08	3.13	2.36
Previous spell 12+, Break 6-9	0	2.68	1.97	1.48	0.73
Previous spell 12+, Break 9-12	0	2.07	1.32	0.77	0.54
Previous spell 12+, Break 12-18	0	2.83	1.25	0.93	0.45
Previous spell 12+, Break 18-24	0	2.60	1.37	0.66	0.18
Proportion of spell had earned income	26.36	24.00	20.55	17.22	15.23
Mean earnings in fortnights that positive ($)	34.82	37.88	40.60	34.45	23.78
Mean local unemp rate at start of spell	8.61	7.45	7.11	7.03	6.88
Proportion of spell on NSA with no search	4.70	5.35	6.69	7.75	6.88
Proportion of spell on NSA with low search	4.65	9.14	10.56	10.72	11.48

Note: Values are the proportions by spell number (using values of variables at spell commencement), except values for variables for earned income, which are averages over entire spells.

Table A5a: Alternative hazard model estimation results without interacted lagged duration effects – Restricting to UB spells only

	Model without unobserved heterogeneity		Model with Gamma distributed unobserved heterogeneity	
	Coefficient	*Std. Error*	*Coefficient*	*Std. Error*
Age 30-34	-0.098**	0.0176	-0.099**	0.0187
Age 35-39	-0.169**	0.0184	-0.175**	0.0198
Age 40 plus	-0.277**	0.0187	-0.292**	0.0204
ESC	0.106**	0.0191	0.111**	0.0207
NESC	-0.099**	0.0154	-0.113**	0.0171
Aboriginal or Torres Strait Isl.	-0.128	0.1090	-0.157	0.1170
Partner on IS benefits	-0.026	0.0198	-0.029	0.0209
Partner not on IS benefits	0.520**	0.0235	0.545**	0.0258
Home owner	0.064**	0.0146	0.071**	0.0159
Other living circumstances	0.114**	0.0172	0.122**	0.0184
Government rent	-0.209**	0.0374	-0.225**	0.0398
Child(ren) indicator	0.011	0.0200	-0.001	0.0211
Local unemp - start	-0.004	0.0034	-0.007*	0.0037
Local unemp - current	-0.036**	0.0036	-0.037**	0.0037
F-T study in previous IS break	-0.103**	0.0448	-0.114**	0.0479
Currently has earned income	0.098*	0.0573	0.099*	0.0593
Proportion of spell (to date) with earnings	-4.55E-04	0.0587	0.006	0.0610
Mean earnings when positive (to date)	1.96E-04	0.0002	2.58E-04	0.0002
Currently on UB	1.557**	0.0480	1.651**	0.0553
NSA with low search	-0.391**	0.0221	-0.397**	0.0227
NSA with no search	-1.228**	0.0358	-1.250**	0.0370
Currently in 3rd IS spell	0.058**	0.0218	0.064**	0.0233
Currently in 4th or greater IS spell	0.092**	0.0271	0.094**	0.0288
Month 1	-4.016**	0.0568	-4.094**	0.0615
Month 2	-3.712**	0.0564	-3.775**	0.0600
Month 3	-3.544**	0.0564	-3.585**	0.0592
Month 4	-3.801**	0.0576	-3.824**	0.0599
Month 5	-3.882**	0.0585	-3.891**	0.0606
Month 6	-3.901**	0.0592	-3.897**	0.0613
Month 7	-3.956**	0.0601	-3.945**	0.0625
Month 8	-4.039**	0.0614	-4.011**	0.0640
Month 9	-4.156**	0.0632	-4.117**	0.0661
Month 10	-4.029**	0.0630	-3.979**	0.0663
Month 11	-4.115**	0.0648	-4.062**	0.0687
Month 12	-4.255**	0.0676	-4.192**	0.0717
Month 13-15	-4.327**	0.0597	-4.248**	0.0654
Month 16-18	-4.420**	0.0619	-4.324**	0.0692
Month 19-21	-4.547**	0.0651	-4.435**	0.0737
Month 22-24	-4.571**	0.0676	-4.439**	0.0776
Month 25-30	-4.683**	0.0634	-4.534**	0.0766
Month 31-36	-4.682**	0.0672	-4.511**	0.0831
Month 37 plus	-5.037**	0.0590	-4.815**	0.0845

Note: ** indicates significance at 5% level. * indicates significance at 10% level.

Table A5a continued: Alternative hazard model estimation results without interacted lagged duration effects – Restricting to UB spells only

	Model without unobserved heterogeneity		Model with Gamma distributed unobserved heterogeneity	
	Coefficient	*Std. Error*	*Coefficient*	*Std. Error*
Previous spell 3-6	-0.111**	0.0261	-0.121**	0.0282
Previous spell 6-9	-0.256**	0.0313	-0.279**	0.0339
Previous spell 9-12	-0.297**	0.0375	-0.324**	0.0406
Previous spell 12-15	-0.329**	0.0473	-0.359**	0.0509
Previous spell 15-18	-0.355**	0.0558	-0.389**	0.0598
Previous spell 18-21	-0.323**	0.0672	-0.363**	0.0718
Previous spell 21-24	-0.572**	0.0622	-0.617**	0.0665
Previous spell 24+	-0.589**	0.0520	-0.628**	0.0554
Break <3	0.120**	0.0268	0.135**	0.0288
Break 3-6	0.160**	0.0252	0.178**	0.0272
Break 6-9	0.234**	0.0298	0.255**	0.0320
Break 9-12	0.251**	0.0332	0.277**	0.0358
Break 12-15	0.252**	0.0386	0.275**	0.0414
Break 15-18	0.228**	0.0460	0.252**	0.0492
Break 18-21	0.270**	0.0472	0.297**	0.0506
Break 21-24	0.282**	0.0419	0.308**	0.0449
Sample size	661,406		661,406	
Log likelihood	-111,803.65		-111,114.41	

Note: ** indicates significance at 5% level. * indicates significance at 10% level.

Table A5b: Alternative hazard model estimation results with interacted lagged duration effects – Restricting to UB spells only

	Model without unobserved heterogeneity		Model with Gamma distributed unobserved heterogeneity	
	Coefficient	*Std. Error*	*Coefficient*	*Std. Error*
Age 30-34	-0.099**	0.0176	-0.101**	0.0187
Age 35-39	-0.172**	0.0184	-0.178**	0.0198
Age 40 plus	-0.281**	0.0187	-0.297**	0.0204
ESC	0.105**	0.0191	0.110**	0.0207
NESC	-0.100**	0.0154	-0.113**	0.0170
Aboriginal or Torres Strait Isl.	-0.129	0.1091	-0.159	0.1168
Partner on IS benefits	-0.030	0.0198	-0.033	0.0209
Partner not on IS benefits	0.519**	0.0235	0.544**	0.0257
Home owner	0.063**	0.0146	0.071**	0.0158
Other living circumstances	0.114**	0.0172	0.122**	0.0184
Government rent	-0.212**	0.0374	-0.228**	0.0398
Child(ren) indicator	0.016	0.0200	0.004	0.0211
Local unemp - start	-0.004	0.0034	-0.006*	0.0037
Local unemp - current	-0.036**	0.0036	-0.037**	0.0037
F-T study in previous IS break	-0.107**	0.0448	-0.117**	0.0478
Currently has earned income	0.096*	0.0573	0.097	0.0593
Proportion of spell (to date) with earnings	0.004	0.0587	0.010	0.0610
Mean earnings when positive (to date)	1.96E-04	0.0002	0.000	0.0002
Currently on UB	1.559**	0.0480	1.652**	0.0553
NSA with low search	-0.395**	0.0221	-0.401**	0.0227
NSA with no search	-1.228**	0.0358	-1.250**	0.0370
Currently in 3rd IS spell	0.061**	0.0218	0.067**	0.0232
Currently in 4th or greater IS spell	0.102**	0.0270	0.105**	0.0287
Month 1	-4.018**	0.0568	-4.095**	0.0614
Month 2	-3.714**	0.0565	-3.776**	0.0600
Month 3	-3.546**	0.0565	-3.587**	0.0591
Month 4	-3.803**	0.0576	-3.827**	0.0598
Month 5	-3.884**	0.0585	-3.894**	0.0606
Month 6	-3.904**	0.0592	-3.901**	0.0613
Month 7	-3.959**	0.0601	-3.949**	0.0624
Month 8	-4.042**	0.0614	-4.015**	0.0640
Month 9	-4.159**	0.0632	-4.121**	0.0661
Month 10	-4.032**	0.0630	-3.984**	0.0663
Month 11	-4.118**	0.0648	-4.067**	0.0687
Month 12	-4.258**	0.0676	-4.196**	0.0717
Month 13-15	-4.329**	0.0597	-4.254**	0.0654
Month 16-18	-4.423**	0.0619	-4.330**	0.0692
Month 19-21	-4.550**	0.0651	-4.441**	0.0737
Month 22-24	-4.573**	0.0676	-4.445**	0.0776
Month 25-30	-4.684**	0.0634	-4.539**	0.0766
Month 31-36	-4.682**	0.0672	-4.516**	0.0831
Month 37 plus	-5.035**	0.0590	-4.819**	0.0846

Note: ** indicates significance at 5% level. * indicates significance at 10% level.

Table A5b continued: Alternative hazard model estimation results with interacted lagged duration effects – Restricting to UB spells only

	Model without unobserved heterogeneity		Model with Gamma distributed unobserved heterogeneity	
	Coefficient	*Std. Error*	*Coefficient*	*Std. Error*
Previous spell < 6, Break 0-3	0.055*	0.0290	0.066**	0.0311
Previous spell < 6, Break 3-6	0.104**	0.0265	0.117**	0.0284
Previous spell < 6, Break 6-9	0.167**	0.0326	0.181**	0.0348
Previous spell < 6, Break 9-12	0.188**	0.0370	0.206**	0.0398
Previous spell < 6, Break 12-18	0.223**	0.0358	0.244**	0.0385
Previous spell < 6, Break 18-24	0.262**	0.0379	0.288**	0.0407
Previous spell 6-12, Break 0-3	-0.129**	0.0480	-0.137**	0.0513
Previous spell 6-12, Break 3-6	-0.134**	0.0428	-0.143**	0.0458
Previous spell 6-12, Break 6-9	-0.021	0.0536	-0.022	0.0573
Previous spell 6-12, Break 9-12	0.009	0.0691	0.012	0.0737
Previous spell 6-12, Break 12-18	-0.114*	0.0604	-0.118*	0.0644
Previous spell 6-12, Break 18-24	0.003	0.0659	0.003	0.0700
Previous spell 12+, Break 0-3	-0.327**	0.0513	-0.352**	0.0549
Previous spell 12+, Break 3-6	-0.250**	0.0505	-0.270**	0.0537
Previous spell 12+, Break 6-9	-0.198**	0.0664	-0.212**	0.0704
Previous spell 12+, Break 9-12	-0.191**	0.0793	-0.191**	0.0838
Previous spell 12+, Break 12-18	-0.224**	0.0710	-0.240**	0.0750
Previous spell 12+, Break 18-24	-0.304**	0.0759	-0.325**	0.0799
Sample size	661,406		661,406	
Log likelihood	-111,827.10		-111,138.37	

Note: ** indicates significance at 5% level. * indicates significance at 10% level.

Table A6a: Alternative model estimation results without interacted lagged duration effects – Requiring a 3 year break prior to first UB spell

	Model without unobserved heterogeneity		Model with Gamma distributed unobserved heterogeneity	
	Coefficient	*Std. Error*	*Coefficient*	*Std. Error*
Age 30-34	-0.083**	0.0269	-0.086**	0.0270
Age 35-39	-0.184**	0.0283	-0.185**	0.0284
Age 40 plus	-0.256**	0.0292	-0.260**	0.0292
ESC	0.081**	0.0300	0.082**	0.0301
NESC	-0.066**	0.0243	-0.064**	0.0243
Aboriginal or Torres Strait Isl.	-0.066	0.1457	-0.063	0.1455
Partner on IS benefits	-0.023	0.0304	-0.026	0.0304
Partner not on IS benefits	0.523**	0.0353	0.521**	0.0354
Home owner	0.063**	0.0239	0.062**	0.0240
Other living circumstances	0.078**	0.0253	0.076**	0.0254
Government rent	-0.132**	0.0601	-0.137**	0.0603
Child(ren) indicator	-0.005	0.0307	-0.005	0.0308
Local unemp - start	-0.003	0.0056	-0.003	0.0056
Local unemp - current	-0.033**	0.0059	-0.033**	0.0059
F-T study in previous IS break	-0.067	0.0591	-0.072	0.0593
Currently has earned income	0.145	0.0932	0.145	0.0931
Proportion of spell (to date) with earnings	-0.029	0.0951	-0.028	0.0950
Mean earnings when positive (to date)	2.67E-04	0.0002	2.80E-04	0.0002
Currently on UB	1.027**	0.0453	1.026**	0.0466
NSA with low search	-0.463**	0.0344	-0.463**	0.0344
NSA with no search	-1.229**	0.0542	-1.229**	0.0543
Currently in 3rd IS spell	0.024	0.0349	0.026	0.0349
Currently in 4th or greater IS spell	0.014	0.0463	0.017	0.0463
Month 1	-3.483**	0.0660	-3.485**	0.0683
Month 2	-3.259**	0.0656	-3.264**	0.0680
Month 3	-3.084**	0.0655	-3.086**	0.0675
Month 4	-3.241**	0.0673	-3.242**	0.0692
Month 5	-3.392**	0.0697	-3.392**	0.0714
Month 6	-3.371**	0.0708	-3.370**	0.0724
Month 7	-3.443**	0.0730	-3.445**	0.0745
Month 8	-3.444**	0.0746	-3.445**	0.0758
Month 9	-3.569**	0.0784	-3.573**	0.0798
Month 10	-3.567**	0.0803	-3.566**	0.0816
Month 11	-3.643**	0.0839	-3.645**	0.0851
Month 12	-3.707**	0.0877	-3.705**	0.0888
Month 13-15	-3.807**	0.0727	-3.805**	0.0738
Month 16-18	-3.860**	0.0769	-3.859**	0.0779
Month 19-21	-4.087**	0.0854	-4.085**	0.0863
Month 22-24	-4.033**	0.0886	-4.031**	0.0893
Month 25-30	-4.214**	0.0828	-4.212**	0.0834
Month 31-36	-4.289**	0.0938	-4.293**	0.0946
Month 37 plus	-4.614**	0.0802	-4.615**	0.0808

Note: ** indicates significance at 5% level. * indicates significance at 10% level.

Table A6a continued: Alternative model estimation results without interacted lagged duration effects – Requiring a 3 year break prior to first UB spell

	Model without unobserved heterogeneity		Model with Gamma distributed unobserved heterogeneity	
	Coefficient	*Std. Error*	*Coefficient*	*Std. Error*
Previous spell 3-6	0.011	0.0385	0.013	0.0385
Previous spell 6-9	-0.226**	0.0463	-0.225**	0.0463
Previous spell 9-12	-0.292**	0.0578	-0.290**	0.0578
Previous spell 12-15	-0.230**	0.0709	-0.233**	0.0711
Previous spell 15-18	-0.478**	0.0841	-0.476**	0.0841
Previous spell 18-21	-0.391**	0.1134	-0.389**	0.1135
Previous spell 21-24	-0.548**	0.0954	-0.546**	0.0953
Previous spell 24+	-0.488**	0.0835	-0.485**	0.0835
Break <3	0.148**	0.0423	0.151**	0.0423
Break 3-6	0.231**	0.0406	0.232**	0.0407
Break 6-9	0.202**	0.0489	0.203**	0.0489
Break 9-12	0.324**	0.0512	0.325**	0.0513
Break 12-15	0.263**	0.0620	0.267**	0.0620
Break 15-18	0.233**	0.0692	0.237**	0.0692
Break 18-21	0.190**	0.0751	0.194**	0.0751
Break 21-24	0.386**	0.0791	0.390**	0.0791
Break 24-27	0.159*	0.0853	0.163*	0.0853
Break 27-30	0.448**	0.0932	0.452**	0.0933
Break 30-33	0.210**	0.1019	0.214**	0.1018
Break 33-36	0.338**	0.0819	0.342**	0.0819
Sample size	254,417		254,417	
Log likelihood	-44,620.52		-44,534.49	

Note: ** indicates significance at 5% level. * indicates significance at 10% level.

Table A6b: Alternative model estimation results with interacted lagged duration effects – Requiring a 3 year break prior to first UB spell

	Model without unobserved heterogeneity		Model with Gamma distributed unobserved heterogeneity	
e	*Coefficient*	*Std. Error*	*Coefficient*	*Std. Error*
Age 30-34	-0.083**	0.0269	-0.085**	0.0270
Age 35-39	-0.183**	0.0283	-0.185**	0.0283
Age 40 plus	-0.255**	0.0291	-0.259**	0.0292
ESC	0.081**	0.0301	0.082**	0.0301
NESC	-0.067**	0.0243	-0.065**	0.0243
Aboriginal or Torres Strait Isl.	-0.067	0.1457	-0.064	0.1455
Partner on IS benefits	-0.024	0.0304	-0.027	0.0304
Partner not on IS benefits	0.523**	0.0353	0.521**	0.0354
Home owner	0.063**	0.0239	0.062**	0.0240
Other living circumstances	0.079**	0.0253	0.077**	0.0253
Government rent	-0.137**	0.0601	-0.142**	0.0603
Child(ren) indicator	-0.003	0.0306	-0.003	0.0307
Local unemp - start	-0.003	0.0056	-0.003	0.0056
Local unemp - current	-0.033**	0.0059	-0.033**	0.0059
F-T study in previous IS break	-0.070	0.0592	-0.075	0.0593
Currently has earned income	0.144	0.0932	0.144	0.0939
Proportion of spell (to date) with earnings	-0.030	0.0951	-0.028	0.0959
Mean earnings when positive (to date)	2.80E-04	0.0002	0.000	0.0002
Currently on UB	1.029**	0.0453	1.027**	0.0452
NSA with low search	-0.465**	0.0344	-0.465**	0.0344
NSA with no search	-1.230**	0.0542	-1.230**	0.0543
Currently in 3rd IS spell	0.024	0.0349	0.026	0.0349
Currently in 4th or greater IS spell	0.015	0.0462	0.017	0.0462
Month 1	-3.483**	0.0659	-3.485**	0.0661
Month 2	-3.260**	0.0655	-3.264**	0.0657
Month 3	-3.084**	0.0654	-3.087**	0.0656
Month 4	-3.242**	0.0673	-3.242**	0.0674
Month 5	-3.393**	0.0697	-3.392**	0.0698
Month 6	-3.372**	0.0708	-3.371**	0.0709
Month 7	-3.444**	0.0730	-3.446**	0.0731
Month 8	-3.445**	0.0746	-3.446**	0.0748
Month 9	-3.570**	0.0784	-3.574**	0.0787
Month 10	-3.569**	0.0803	-3.567**	0.0805
Month 11	-3.644**	0.0838	-3.645**	0.0840
Month 12	-3.708**	0.0876	-3.706**	0.0879
Month 13-15	-3.808**	0.0727	-3.806**	0.0729
Month 16-18	-3.862**	0.0769	-3.860**	0.0772
Month 19-21	-4.088**	0.0854	-4.086**	0.0857
Month 22-24	-4.034**	0.0886	-4.031**	0.0890
Month 25-30	-4.215**	0.0828	-4.212**	0.0832
Month 31-36	-4.289**	0.0938	-4.292**	0.0943
Month 37 plus	-4.613**	0.0802	-4.613**	0.0806

Note: ** indicates significance at 5% level. * indicates significance at 10% level.

Table A6b continued: Alternative model estimation results with interacted lagged duration effects – Requiring a 3 year break prior to first UB spell

	Model without unobserved heterogeneity		Model with Gamma distributed unobserved heterogeneity	
	Coefficient	*Std. Error*	*Coefficient*	*Std. Error*
Previous spell < 6, Break 0-3	0.122**	0.0453	0.125**	0.0453
Previous spell < 6, Break 3-6	0.245**	0.0429	0.246**	0.0430
Previous spell < 6, Break 6-9	0.242**	0.0536	0.246**	0.0536
Previous spell < 6, Break 9-12	0.295**	0.0571	0.296**	0.0571
Previous spell < 6, Break 12-18	0.279**	0.0558	0.283**	0.0558
Previous spell < 6, Break 18-24	0.235**	0.0665	0.239**	0.0665
Previous spell < 6, Break 24-30	0.262**	0.0731	0.266**	0.0731
Previous spell < 6, Break 30-36	0.257**	0.0739	0.262**	0.0739
Previous spell 6-12, Break 0-3	-0.097	0.0744	-0.094	0.0744
Previous spell 6-12, Break 3-6	-0.087	0.0686	-0.083	0.0686
Previous spell 6-12, Break 6-9	-0.124	0.0899	-0.120	0.0898
Previous spell 6-12, Break 9-12	0.099	0.1059	0.103	0.1059
Previous spell 6-12, Break 12-18	-0.048	0.0929	-0.043	0.0928
Previous spell 6-12, Break 18-24	0.201*	0.1124	0.206*	0.1123
Previous spell 6-12, Break 24-30	0.153	0.1539	0.158	0.1538
Previous spell 6-12, Break 30-36	0.150	0.1375	0.155	0.1373
Previous spell 12+, Break 0-3	-0.225**	0.0846	-0.221**	0.0846
Previous spell 12+, Break 3-6	-0.188**	0.0810	-0.183**	0.0810
Previous spell 12+, Break 6-9	-0.306**	0.1062	-0.312**	0.1068
Previous spell 12+, Break 9-12	-0.055	0.1140	-0.051	0.1139
Previous spell 12+, Break 12-18	-0.270**	0.1162	-0.266**	0.1161
Previous spell 12+, Break 18-24	-0.218*	0.1339	-0.212	0.1337
Previous spell 12+, Break 24-30	-0.172	0.1808	-0.168	0.1807
Previous spell 12+, Break 30-36	-0.232	0.2432	-0.226	0.2436
Sample size	254,417		254,417	
Log likelihood	-44,626.12		-44,539.81	

Note: ** indicates significance at 5% level. * indicates significance at 10% level.

Table A7: Description of variables

All variables are dummy variables unless otherwise indicated

Age n-m *(time-varying)* (Age 25-29 omitted category)	Individual's age is between n and m years
Country of origin (time invariant)	
Australian-born (omitted category)	Born in Australia and is not an Aboriginal or Torres Strait Islander
ESC	Born in one of the main English-speaking countries: Canada, United Kingdom, Ireland, New Zealand, United States and South Africa
NESC	Born overseas in other country
Aboriginal or Torres Strait Isl. (ATSI)	Aboriginal or Torres Strait Islander
Partner status (time-varying)	
Single (omitted category)	Does not currently have a partner
Partner on IS	Currently has a partner who is also currently receiving an income support payment
Partner not on IS	Currently has a partner who is not currently receiving an income support payment
Housing / Living circumstances (time-varying)	
Home owner	Currently owns or jointly owns their home, or currently lives in a residence where they do not have to pay rent, board or lodgings
Private rent (omitted category)	Currently lives in a residence where they are required to pay rent, board or lodgings
Government rent	Currently lives in a residence that is government operated where they are required to pay rent, board or lodgings
Other living circumstances	Currently lives in a circumstance other than those above
Child(ren) indicator *(time-varying)*	Currently is responsible for the care of a dependent child or children
Local unemp – start *(continuous; time invariant)*	The unemployment rate (in percentage points) in the person's labour force statistical region at the commencement of the current spell. Individuals' postcodes were used to identify to which of the 64 labour force statistical regions they belonged, and then ABS measures of the monthly unemployment rate for these regions over 1995 to 2003 were used.
Local unemp – current *(continuous; time-varying)*	The current unemployment rate (in percentage points) in the person's labour force statistical region.
F-T study in previous IS break *(time-varying across spells of individuals, but time-invariant within spells)*	Individual undertook full time study, for which they received Youth Allowance (full-time education) Austudy or Abstudy, in the payment break immediately preceding the current spell. This study must have taken place within two years of commencement of the current spell.
Currently has earned income *(continuous; time-varying)*	Has labour market earnings in the current fortnight.
Proportion of spell (to date) with earnings *(continuous; time-varying)*	Proportion (0 to1) of the spell so far that the person has reported labour market earnings, calculated as the number of fortnights up to present with earned income as proportion of total number of fortnights in the spell so far.
Mean earnings when positive (to date) *(continuous; time-varying)*	Mean fortnightly labour market earnings ($) received in those fortnights in which reported earnings so far in the spell. This is calculated as total earned income received so far in the spell divided by the total number of fortnights that person has received earned income so far in spell.

Table A7 continued: Description of variables

All variables are dummy variables unless otherwise indicated

Labour Force attachment /Job search requirements (time-varying)	
Currently on UB *(time-varying)*	Currently receiving an unemployment benefit: Job Seeker Allowance (JSA), NewStart Allowance (NSA), Youth Training Allowance (YTA), and Youth Allowance (other) (YA(o))
NSA with high search (omitted category)	Currently receiving NSA and has a reported activity type that requires them to engage in significant job search, or involves significant contact with the labour market through either part-time work, self-employment, or other forms of employment or community service.
NSA with low search	Currently receiving NSA and has a reported activity type that involves minimal contact with the labour market through such activities as: education, training, voluntary work, compulsory work, and mutual obligation.
NSA with no search	Currently receiving NSA and has a reported activity type that involves no job search requirements nor contact with the labour market, which includes persons with a major personal crisis, caring responsibilities, are incapacitated, or have disability support claim pending.
Currently in 3rd IS spell *(time-varying)*	Current spell is the 3rd spell on income support payments since the 'clean start' spell that commenced in 1997-98.
Currently in 4th or greater IS spell *(time-varying)*	Current spell is the 4th or higher spell on income support payments since the 'clean start' spell that commenced in 1997-98.
Spell duration indicators (time-varying)	
Month n	Current spell duration is within the nth 'month' of duration, where a 'month' is defined to be two fortnights. That is, spell duration is *2n* fortnights.
Month n-m	Current spell duration is within the nth to mth 'months' of duration, where a 'month' is two fortnights.
Month 37 plus	Current spell duration is 37 or more 'months' of duration, where a 'month' is two fortnights.
Previous IS spell characteristics (time-varying across spells of individuals, but time-invariant within spells)	
Previous spell n-m ('Previous spell 0-3' is the omitted category)	Income support spell immediately preceding the current spell concluded within two years of commencement of the current spell and had a duration of n-m 'months', where a 'month' is two fortnights.
Break n-m	The length of time between the completion of the person's previous spell and the commencement of their current spell was within the n-m 'month' range, where a 'month' is two fortnights.
Previous spell < 6, break n-m	Previous income support spell was less than 6 'months' long and ended n-m 'months' prior to commencement of the current spell.
Previous spell 6-12, break n-m months	Previous income support spell was 6-12 'months' long and ended n-m 'months' prior to commencement of the current spell.
Previous spell 12+, break n-m	Previous income support spell was 12 or more 'months' long and ended n-m 'months' prior to commencement of the current spell.