SHORT AND LONGER TERM UNEMPLOYMENT: 
AN ANALYSIS OF UNEMPLOYMENT DURATIONS

Sue Lambert

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Sue Lambert*
Murdoch University

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CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive Summary</td>
<td>i</td>
</tr>
<tr>
<td>I. Introduction</td>
<td>1</td>
</tr>
<tr>
<td>II. The Search Model</td>
<td>3</td>
</tr>
<tr>
<td>III. Data and Analysis</td>
<td>6</td>
</tr>
<tr>
<td>IV. Conclusion</td>
<td>14</td>
</tr>
<tr>
<td>References</td>
<td>16</td>
</tr>
<tr>
<td>Appendix Tables A1-A7</td>
<td>18-21</td>
</tr>
<tr>
<td>List of Recent CEPR Discussion Papers</td>
<td>22</td>
</tr>
</tbody>
</table>
Executive Summary

This paper reports results from a microeconomic analysis of unemployment durations. Separate split population duration models are estimated for females and males using data from the ABS 1989-90 Income Distribution Survey. The results indicate a significant difference between the short duration and long duration unemployed which can be related to a number of labour market and demographic characteristics. Females have an increased risk of being amongst the longer duration unemployed if they are less than 25 years of age, face relatively low market wages and have dependent children. Longer spells of short term unemployment (unemployment which lasts for less than one year) are experienced by women older than 25, by unmarried women, by women with lower non-wage incomes and by women from English speaking backgrounds. Women with occupations in administrative, management or professional fields have significantly shorter spells of short term unemployment.

Males are more likely to be among the long term unemployed if they face low market wages, are unmarried, were previous employed in the public sector, have high non-wage incomes or are aged between 18 and 24. Their spells of short term unemployment are longer if they are unmarried, face low market wages, are older than 29, have dependent children, or are from an English speaking background. Male short term unemployment is also significantly less for those with occupations in administrative, management or professional fields, and for those engaged in further education.

There is no support for the existence of state dependence in short term unemployment and the dominance of certain characteristics among the longer term unemployment weakens the argument in favour of state dependence as an important factor generating longer term unemployment. Rather, longer term unemployment appears to be concentrated among particular groups of individuals and to be related to an important change in the structure of employment, namely the large fall in public sector employment for males. This suggests that public sector employees should be given special counselling and training before they leave their jobs to ensure they are aware of conditions in the labour market outside of the public sector and are able to effectively go about searching for further employment. Similarly, young people and women with children deserve special attention in more general training programs aimed at reducing long term unemployment.
I. Introduction

Persistently high rates of unemployment, associated with an outward shift in the U-V curve and typified by high and increasing durations of unemployment are now a feature of many developed economies. Evidence from the considerable research into this issue suggests that the direction of causation runs from increasing unemployment durations to worsening U-V relationships and that increasing unemployment durations are correlated with reduced search activity and with withdrawal from the labour market.1 (Brooks et al, 1986; Budd et al, 1987; Jones and Manning, 1990; Blanchard and Diamond, 1990; Moller, 1990) Dominant in much of the research on unemployment, including that focused on unemployment durations, is the issue of path dependence. Path dependence implies some form of hysteresis and there is considerable evidence of this for the UK, Germany and Australia although not elsewhere. (Barro, 1988; Gordon, 1989; Coe, 1990; Jaeger and Parkinson, 1990; Gronewold and Taylor, 1992)2 The microeconomic mechanisms through which hysteresis might operate are, however, uncertain. The persistence of falls in the capital stock which occur during recessions is one possibility.3 The effective use of insider power or loss of human capital due to unemployment are others. The operation of hysteresis through the vehicle of insider power has received particular attention in Australian. (see for example Watts and Mitchell, 1990; Gronewold and Jones, 1992). The human capital issue is explored in Phelps (1972), Hargreaves Heap (1980), Budd et al (1988), Pissarides (1992) and Price (1992).

The possibility that there may also be an element of state dependence in high duration unemployment is a further matter of concern with implications for appropriate policy formation as well as for the hysteresis debate. The issue of state dependence is discussed in Sims (1977), Lancaster (1979), Heckman and Borjas (1981), Budd et al, (1987) and Viswanath (1989). Here the focus is explicitly upon the microeconomic operation of the labour market and upon various aspects of the unemployment experience. The question addressed is whether the experience of unemployment itself causes a fall in the probability of re-employment for some individuals. That is, does the unemployment experience itself introduce a degree of structure into otherwise random groups of unemployed workers such that individual escape rates from unemployment fall as time spent unemployed increases. Human capital decay and stigma effects which

1 There are, however, significant differences in the experiences of different countries, in particular the US and Japan. See for example Blanchard and Diamond’s (1989) analysis of the U-V curve for the US and Gordon (1988) for a discussion of differences in a number of unemployment related issues across a wide range of countries.

2 See also Abgossen (1987) for an alternative perspective which finds against the importance of insider power.

3 See for example Sacks (1987) capital-scraping model.
cause employers to discriminate against the longer term unemployed are two possible causes of state dependence. With the exception of Chapman and Smith (1993) there has been little microeconomic analysis of this issue for Australia. Yet the change towards high duration unemployment is evident with average unemployment durations increasing for females as well as males. In 1985 mean (median) weeks unemployed were 36.3 (19) and 58.0 (30.1) for females and males respectively. By August 1994 these had increased to 50.1 (24) and 65.9 (33). These figures have fallen considerably over the past 18 months and at March 1996 stood at 39.5 (13) for females and 55.7 (19) for males. The training programmes set up by the previous Federal Government under *Working Nation* are undoubtedly responsible for at least part of the falls. It is too early to say how effective these programmes will be in placing the long term unemployed in continuing employment.

A related issue is that of labour market withdrawal. Although the cyclical behaviour of female discouraged worker effects is well documented, the relationship between the duration of unemployment and labour market withdrawal is less well understood. This is true for males as well as females. To illustrate the importance of labour market withdrawal, gross flows figures indicate that 27.1 percent of unemployed married females, 21.2 percent of unemployed unmarried females and 14.4 percent of unemployment males left the labour force in the March quarter 1996. Labour market withdrawal may be viewed as a form of continuing unemployment, especially if it is induced as a result of discouragement due to the worker's experience of unemployment. Certainly it is not clear that it is less valid to treat the labour market withdrawal of previously unemployed individuals in this way than it is to remove them from the analysis altogether on the assumption that they no longer desire to take part in the workforce.

The issue of state dependence cannot be directly tested with data available for the Australian economy. However, some idea of the importance of state dependence as a determinant of longer term unemployment can be gained by examining the demographic and labour market characteristics of the longer term unemployed relative to those of the shorter term unemployed. The importance of state dependence as a determinant of high duration unemployment is strengthened if the two groups of individuals are indistinguishable on the basis of characteristics, but weakened if certain labour market and other characteristics are dominant only among longer term unemployed. This issue is addressed here through analysis of unemployment durations for a cross section of

---

4 The Labour Force Australia Cat. No. 6203.0.
unemployed individuals from the 1990 Income Distribution Survey. The theoretical framework is provided by the search model which is discussed in Section 2. Section 3 discusses the data and empirical findings. Section 4 contains some concluding comments.

II. The Search Model

The theoretical framework for microeconomic analysis of unemployment is given by the search model wherein the unemployed are viewed as facing a distribution of wage offers, \( f(w) \), from which they receive one offer, \( w \), with a probability, \( \sigma \), within a certain short period of time.\(^6\) \( w \) and \( \sigma \) are independent random variables and individuals are typically assumed to know the wage offer distribution relevant to them.\(^7\) An unemployed individual also receives non-wage income, \( y \), net of search costs, which is constant over the period of unemployment. The economic problem individuals face is to maximise the expected present value of their income streams, discounted over their working lives. The utility, \( V \), of a particular wage offer, \( w \), to an unemployed person can be written as,

\[
V(w) = \max \{ V^e(w), V^u(w) \}
\]

where \( r \) is a subjective, per period, discount rate and \( V^e \) and \( V^u \) are the utility associated with being employed and unemployed respectively. \( V^e \) is continuous and increasing in \( w \) and \( V^u \) is constant by assumption of a constant per period non-wage income, \( y \). A time invariant reservation wage policy is thus optimal and it can be shown that this reservation wage has the following general form,

\[
w_r(y, f, \sigma, r) = y + \alpha r \int_{w_{min}}^{w_{max}} (w - w) f(w) \, dw
\]

\( w_r > 0 \)

\( 0 < \sigma < 1 \)

\( 0 < r < 1 \)

Here the reservation wage is, in effect, a reduced form price equation that brings into equilibrium the discounted marginal gain of continuing to search with the marginal cost of search. It therefore incorporates variables from both sides of the market: \( f(w) \), from

\[^6\text{These are really offers of jobs that have associated with them a particular bundle of characteristics, including such things as hours, fringe benefits, working conditions, potential for training and promotion and so on, as well as the wage rate. However, the job offer is characterized in the search model by its associated wage because this is the most evident component of the offer and because wages are known to be highly correlated with other non-wage benefits of work.}\]

\[^7\text{\( \sigma \), often referred to as the arrival rate of offers, is assumed to follow a Poisson process and so measures the probability of receiving just one job offer in a given short period of time.}\]
the demand side of the market, preferences, \( r \), and non-wage income, \( y \), from the supply side of the market, and the probability of receiving an offer, \( \sigma \), which may be a function of behaviour on both sides of the market.

Within this model, the reservation wage and duration of search are simultaneously determined with individuals searching until they receive a wage offer which dominates their reservation wage. That is, until a \( w \geq w_r \) is received. The relationship between the duration of search and the reservation wage is seen in the probability of becoming re-employed, which is,

\[
\lambda(t) = \sigma \phi(w_r) = \sigma \int_{w_r}^{\infty} f(w)dw = \sigma(1 - F(w_r)) \quad w_r > 0
\]

where \( \lambda(t) \), the probability of being re-employed at time \( t \), is the escape rate from unemployment, or the re-employment hazard, \( \sigma \) is the probability of receiving an offer, and \( \phi(w_r) \) is the probability that any given wage offer will be acceptable. Other things being equal, \( \lambda \) will be decreasing in the level of non-wage income, \( y \), and increasing in the rate of time preference, \( r \), and the mean of the wage offer distribution, \( \mu_w \). The derivative with respect to \( \sigma \), the probability of receiving an offer is indeterminate, although, the more sensitive the reservation wage is to the this variable (the larger \( \partial \sigma / \partial \sigma \)) the more likely it is that the escape rate will rise with \( \sigma \). This implies that, other things being equal, the duration of search will be higher for those with higher non-wage incomes and lower probabilities of receiving a job offer, and lower for those with higher mean job offers and higher discount rates.

The search model assumes that the search parameters, \( f, \sigma, y \) and \( r \) are constant over the period of search implying a time invariant re-employment probability, or a constant hazard rate, \( \lambda(t) = \sigma \phi(w_r) = c \). Different individuals will, of course, face different search parameters, and will therefore have different reservations wages and find it optimal to search for differing periods of time. However, for any one individual, the escape rate from unemployment must be time invariant so long as the search parameters they face remain constant.

The finding from a majority of empirical studies that the escape rate from unemployment falls with increases with unemployment durations must therefore be due to non-stationarity in some element of the search environment, or to unaccounted for heterogeneity in the empirical analysis. The former may imply a form of state dependence while the latter is simply an artefact of an inadequately specified estimating...
equation. As estimated hazards can be effected by changes in any aspect of the search environment and by a number of statistical issues, it is useful to consider each in turn in order to assess their likely effect upon the hazard and their implications for the issue of state dependence.

A leftward shift in the wage offer distribution, a fall in the arrival rate of offers (assuming \(\partial \nu / \partial \sigma\) is sufficiently large) or a fall in the discount rate over the period of search will all yield a decreasing hazard which implies a degree of negative duration dependence. For example, the wage offer distribution individuals face may be shifting to the left because their human capital is decaying while they are unemployed. The probability of receiving a job offer may also fall as the duration of time spent unemployed increases due to stigmatisation of the unemployed which leads employers to discriminate against prospective employees on the basis of their unemployment histories. It could also occur if employment agencies use allocative strategies which discriminate against those who have been unemployed the longest. For example, a cost minimising strategy for an employment agency may be to send individuals for job interviews on the basis of the probability of them gaining the job, which they may deem to be negatively related to past unsuccessful applications. Viswanath (1989) provides theoretical evidence, based on a model of stigma effects, for negative duration dependent reservation wages and escape rates while Winter-Ebmer (1991) finds empirical evidence of discrimination on the basis of unemployment duration by employment agencies and employers.

Changes in preferences, expressed here in terms of the rate of time preference (the discount rate) are more problematic. Although it is conceivable that some individuals may become discouraged or socialised into welfare dependence and acclimatised to a lower standard of living if they are unemployed for a sufficiently long period of time, it is difficult to see how this effect could exist independent of the source of the discouragement, that is, a the low arrival rate of offers, or unmet wage expectations.

On the other hand, an estimated hazard will increase if individuals' non-wage incomes fall over the period of search or if information constraints are present. Falls in non-wage income due to institutional arrangements such as those in the United States and a number of other countries will generate such an increasing hazard. Information constraints and learning will also cause hazards to increase. For example, workers'...

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9 Training programmes such as those instituted under the previous federal labour government's *Working Nation* policies are aimed at maintaining or restoring part of the human capital of the longer term unemployed.

10 The termination of unemployment benefits after 12 months and introduction of the job start allowance might be seen as the first step in a movement in this direction in Australia also.
expectations may be such that they believe the mean of the wage offer distribution they face to be higher than the true mean. Thus they will expect to receive, on average, higher wage offers than they actually do, which will be reflected in their reservation wages and the duration of time they spend unemployed. As the true $f(w)$ is revealed over time and workers revise their $w$, down the probability of leaving unemployment will rise. This is shown theoretically by Burdett and Vishwanath (1988). Thus, ceteris paribus, information constraints and learning of this type will generate positive duration dependence in the escape rate. If present, these effects will act to counteract any negative duration dependence that may be present in the estimated hazard.

It is also possible that the search parameters differ across individuals in ways which are difficult to identify, but which lead to some individuals having lower than average escape rates from unemployment or lower re-employment hazards. In this case, as unemployment durations rise, the estimations are carried out over individuals with increasingly poorer labour market characteristics which are inadequately controlled for in the analysis. In this case, however, the decreasing hazard yielded by the estimations is a purely statistical artefact, created by the unaccounted for heterogeneity.

Censoring is a further important statistical issue. Censored observations are those with the highest durations and their omission from the estimations introduces an upward, asymptotic bias into the estimated hazard. These issues are addressed further in the context of the estimations discussed below.

III Data and Analysis

The data used in the estimations are from the 1990 Income Distribution Survey. Although this is a moment-in-time cross section the data also contain some individual histories. For example, information is available on individuals' current weekly income, labour force status and hours worked, as well as their income and labour force status during the previous financial year. Most importantly for this study, information is provided on the number of weeks employed and unemployed over the previous financial year, together with earnings, industry, occupation and sector of employment.\textsuperscript{11} The survey was taken 4 to 5 months after the end of the financial year, during October-November 1990. This raises the issue of reliability in the estimates of annual variables, but also provides a much better indication of the extent of longer term unemployment.

\textsuperscript{11} Unfortunately there is no distinction between spells of unemployment and duration of unemployment so that occurrence, duration and lagged duration dependence are confounded in these data.
A sample for duration analysis was chosen by selecting individuals between the ages of 18 and 64 who were unemployed for at least 1 week during 1989-90 and employed for the rest of the year. This sample can be treated as duration data on the assumption that the probability of becoming unemployed, P(U) for any given individual is constant across each week of the year. Thus

\[
\begin{align*}
P(U_i) &= P(U_j) \quad \text{if } i \neq j \\
P(U_n) &= \sum_{i=1}^{n} P(U_i)
\end{align*}
\]

where \(i, j\) represent ith and jth weeks of the year, and \(n\) is the total number of weeks unemployed for any given individual. Demographic and employment characteristics for the sample are given in Tables A1 and A2 of the Appendix. Table A3 provides definitions of the variables used in the analysis.

### Table 1

**Individuals grouped by past and current labour force status**

<table>
<thead>
<tr>
<th>Group</th>
<th>Labour Force Status</th>
<th>Wage Relationship</th>
<th>Females*</th>
<th>Males*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ud = 52 weeks*</td>
<td>(w \geq w_r)</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>clfs = N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0 &lt; Ud &lt; 52</td>
<td>(w \geq w_r)</td>
<td>553</td>
<td>686</td>
</tr>
<tr>
<td></td>
<td>clfs = N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Ud = 52 weeks</td>
<td>(w &lt; w_r)</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>clfs = U</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0 &lt; Ud &lt; 52</td>
<td>(w &lt; w_r)</td>
<td>165</td>
<td>304</td>
</tr>
<tr>
<td></td>
<td>clfs = U</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Ud = 52 weeks</td>
<td>(w &lt; w_r)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>clfs = wlm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>0 &lt; Ud &lt; 52</td>
<td>(w &lt; w_r)</td>
<td>89</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>clfs = wlm</td>
<td></td>
<td>(819)</td>
<td>(1040)</td>
</tr>
</tbody>
</table>

*Ud = weeks unemployed during the year; clfs = current labour force status*
Table 1 identifies six possible groups of individuals in accordance with their past unemployment duration and current labour market status. These groupings are used to categorise individuals as either short term or long term unemployed. The short term unemployed are those comprising groups 1 and 2. They are individuals who were unemployed for at least one week during the 1989-90 financial year but were employed at the time of the survey in October-November 1990. The long term unemployed are those individuals unemployed for at least one week during the year and were either unemployed or out of the labour market at the time of the survey. These are the individuals who comprise groups 3, 4 and 6 (group 5 being empty).

Figures 1 and 2 show the annual unemployment distributions for the full sample and the sample of short term unemployed. Figure 3 shows the annual unemployment distributions for the sample of long term unemployed.

**Figure 1**

Distribution of weeks unemployed by females 1989-90
full sample and short term unemployed sample
The mean unemployment duration as measured by weeks unemployed during the previous year is higher for the long term unemployed and the fact that these observations are also recorded as being unemployed some 16-20 weeks later when the survey was taken indicates that this mean duration is in fact even higher, as it is known that less than 5 percent of unemployed people in Australia have more than one spell of unemployment during any two year period. Thus the actual mean unemployment duration for the group of longer term unemployed is likely to be closer to 40.5 weeks for females and 42.7 weeks for males, than the 1989-90 averages of 22.5 and 24.7.
weeks for females and males respectively. These mean values are approximately two and a half times greater than the corresponding full sample values of 15.8 and 17.6 weeks. The probability of returning to work in under one year must be relatively low, on average, for this group. It is on this basis that these individuals are considered to provide a reasonable representation of the longer term unemployed, while the remaining observations are considered a good representation of the shorter term unemployed.

A model of unemployment durations based on Schmidt and Witte’s (1989) split population model is used to examine the differences between these two groups of individuals and to estimate the re-employment hazard for the short term unemployed. In the context of this model, the long term unemployed are treated as censored observations and the short term unemployed as uncensored observations over which the survival function is estimated. The procedure first estimates a probit (or logit) equation to determine whether the censored observations (in this case the long term unemployed) belong to the tail of the distribution of uncensored observations (the short term unemployed). Expressing the probability of eventual re-employment for the censored observations as \( P(N = 1) = \delta \), the probit (logit) equation tests whether \( \delta \) is significantly less than 1. The value obtained for \( \delta \) is then used to condition the log-likelihood equation used to estimate the duration model. Allowing \( \delta \) to depend on a range of labour market and other observable characteristics provides information on the differences between the two sets of observations. Thus if \( \delta = G(\beta'x_i) \) the log-likelihood for estimation of the duration model becomes,

\[
\text{lnL} = \sum_{i=1}^{n} \ln \{ G(\beta'x_i) / (1-\delta) \} f(x_i) + \sum_{i=1}^{n} \ln \{ 1 - G(\beta'x_i) + G(\beta'x_i)S(x_i) \}
\]

\[
z_i = (\ln(1-\delta) - \beta'x_i) / \sigma
\]

where \( x \) is a vector of co-variates and \( \beta \) a vector of coefficients.\(^{12}\)

The logic underlying this procedure is analogous to that for including censored observations at all in estimations of a duration model. That is, because censored observations have the highest durations, their omission will impart a downward (asymptotic) bias to the estimated survival rate and an upward (asymptotic) bias to the estimated hazard. If in addition these observations are, on average, significantly less likely to ever return to work, some of the bias imparted to the estimated survival and hazard rates will remain, even though the censored observations are included in the analysis. Weighting both censored and uncensored elements of the likelihood by the estimated re-employment probability is an attempt to eliminate this remaining element of censoring bias. The advantages of this methodology to the analysis of unemployment durations are first, that it provides a method of testing whether there is any significant

\(^{12}\) Exploratory estimations indicated the probit model was an appropriate specification for the probability of eventual employment and so this specification was used to estimate \( G(\beta'x) \).
difference between the shorter and longer term unemployed. Second, that this
difference, if any, can be related to demographic and labour market characteristics
which has implications for the importance of state dependence and third, that the
analysis is carried out within a theoretically appropriate dynamic structure which
focuses upon the duration of unemployment.13

Following Schmidt and Witte, the relative appropriateness of the split population model
for the data and issues being investigated is addressed by estimating duration models
with a variety of distributional assumptions. First the data were fitted with Cox’s semi-
parametric proportional hazard model. These results are given in Table A4 of the
appendix. The log-likelihood suggests this model is a poor fit for the data, although the
signs on the estimated coefficients are in accordance with theoretical predictions and
other empirical evidence. Sharma (1987) suggests that such an apparent poor fit for a
proportional hazard model may be the result of unaccounted for heterogeneity.
However, the considerably better fit given by the parametric models, especially the split
population model, suggest that the model specification and treatment of the censored
observations, rather than heterogeneity per se, lie behind the poor fit of the equations
for this model. A variety of parametric duration models were estimated with censoring
taken into account, but with the probability of eventual return to work set equal to one
for all observations. There were no major differences between the results from these
estimations and those for the lognormal model are presented in Table A5 of the
appendix.

Tables A6 and A7 of the appendix give the results from the split population estimations
which allow for the probability that some of the censored observations might never
return to work. These estimations yield an average eventual re-employment probability
of 0.86 for females 0.94 for males. This implies that at least 14 percent of females, or
37 of the 262 females in the censored sample, and 6 percent of males, or 21 of the 347
males in the censored sample, will never return to work. These estimates are
downwardly biased because of the misallocation to the censored sample (the long term
unemployed) of some observations which rightly belong with the non-censored
observations (the short term unemployed). This is an inevitable result of the data used
in the analysis. A major effect of the misallocated observations is to bias the probit

13The observations treated as censored in this particular application are clearly not strictly censored as
they include some individuals who have been employed during the year. The nature of the data used
makes this inevitable with those who become unemployed later in the year being more likely to be
included among the censored observations. However, it is evident from the graphs given in Figures
1, 2 and 3 that although more of the censored observations are clustered into the lower weeks
unemployed category, they are much more evenly spread across the distribution of annual hours than
uncensored observations. Thus the bias associated with misallocating some of the observations
which belong to the density function to the tail of the survival function is likely to be very small.
analysis in favour of finding no significant differences between the two groups of individuals. Thus the estimated re-employment probabilities are upwardly biased relative to their true values and the estimates of the numbers likely to never return to work are downwardly biased.

Relating these differences to labour market and demographic characteristics reveals more detailed differences between the two groups. Low market wages, while uniformly significant throughout all of the duration equations estimated with the probability of eventual return to work equal to one are important for females only in increasing the probability of long term unemployment. For males low market wages are significantly correlated with both the probability of long term unemployment and the extent of short term unemployment, although the former effect is considerably larger than the latter. This suggests an important distinction between the short and longer term unemployed with low market wages being considerably more important in determining whether an individual will among the long term unemployment than in determining the extent of short term unemployment.

Higher non-wage income, on the other hand, is significantly correlated only with the probability of long term unemployment for males. For females, although high non-wage income significantly increases the probability of long term unemployment, it has the opposite and seemingly perverse effect on the extent of short term unemployment. That is, high non-wage income is significantly correlated with a reduced extent of short term unemployment. This might not be as perverse as it first appears as it may be due to the tendency for well educated females to marry well educated, and hence higher income, males in conjunction with the correlation between higher levels of education and stronger attachment to the labour force. All of the coefficients on the non-wage income variable are, however, so small as to cast doubt on the importance of non-wage income as a determinant of behaviour for this group of people.

Married men have significantly shorter spells of short term unemployment that other men, and a reduced probability of being among the long term unemployed, with the latter effect being considerably larger than the former. For females being married has no effect on the probability of being long term unemployed, but it is significantly correlated with reduced short term unemployment. The presence of dependent children, on the other hand, while being uncorrelated with the extent of short term unemployment, significantly increases the probability of long term unemployment for females. For males the effect is of children is reversed. Males with dependent children are no more likely than other males to be long term unemployed, although they do have significantly longer spells of short term unemployment. The relative size of the
coefficients also suggest that dependent children have a weaker effect on male behaviour than on female behaviour. This result is consistent with other empirical evidence on the relationship between female labour market withdrawal and dependent children and with the existence of relatively greater distortions to work incentives for women relative to men, especially women with children.\footnote{It is now well established that women suffer a penalty of approximately 10 percent on the return to their human capital relative to men. Similarly, the work disincentive effects flowing from the taxation and income support systems bear more heavily on sole parents (the majority of whom are women) because of their responsibility for children.}

Being from an English speaking background (Aust/English) increases the extent of short term unemployment but not the probability of being unemployed over the longer term for both females and males. This suggests that those from an English speaking background spend, on average, slightly longer periods of time searching for the right job if they become unemployed, but that they are no more likely to be among the long term unemployed than workers from non-English speaking backgrounds.

Males currently engaged in further education are no more or less likely to be among the long term unemployed than other males, but their spells of short term unemployment are significantly less. On the other hand, females engaged in further education are more likely to be among the long term unemployed, while their short term unemployment spells are insignificantly changed. This suggests very different patterns of study for females and males with further education being more closely related to current employment for males than it is for females. The descriptive statistics presented in Tables A1 and A2 are consistent with this interpretation. They indicate that, while the overall proportions of females and males currently studying are similar (0.15 versus 0.12), the censored sample proportions are very different, with 22 percent of females who are unemployed or withdrawn from the labour market studying versus only 11 percent of males.

The dummy variable for the public sector was included to capture insider power effects and the coefficient estimates here suggest that for males, becoming unemployed from a public sector job leads to an increased probability of long term unemployment, although it is unimportant in determining the extent of short term unemployment. For females, becoming unemployed from a public sector job is irrelevant in determining the extent of short term unemployment and the probability of being unemployed over the longer term. As the effective exercise of insider power raises the wages of those inside the organisation above their market clearing levels, individuals who become unemployed from such jobs might have unrealistically high wage aspirations when they search for a
new job. If this effect is operating, the results here suggest that males unemployed from the public sector are reluctant to revise their wage expectations down and thus more likely to become part of the long term unemployed. Moreover, the size of the coefficient suggests that this effect is very strong. The result is also independent of the occupation previously held by these individuals, as a dummy variable for occupational status was also included in the analysis. The effect of this variable, coded one for previous employment as a manager, administrator, professional or para-professional has a relatively more uniform effect in that it reduces the extent of short term unemployment for both females and males but is uncorrelated with the probability of being among the long term unemployed. Taken together, these results suggest that males who become unemployed from public sector jobs, irrespective of their occupation, have a very high risk of remaining unemployed over the long term.

The results for being younger than average, that is, aged between 18 and 24, are consistent with the results from Chapman and Smith (1993) that long term unemployment is more prevalent among young males. The results here suggest that this is also true for young women. However, once the increased probability of being among the long term unemployed is taken into account, the duration of short term unemployment is significantly less for young people than it is for older unemployed workers. This latter effect is, however, very much smaller than the effect of age on the probability of being among the long term unemployed. The coefficient on the dummy variable for being aged between 18 and 24 is 1.06 for females and 1.43 males. In each case, this is second only to the wage variable in size, suggesting that being young is the second most important risk factor for becoming long term unemployed.

The parameter estimates for the split population model suggest that state dependence is not an issue for those unemployed for less than one year. The fact that certain characteristics are dominant among the longer term unemployed, in particular youth, low wages, previous employment within the public sector for males and the presence of dependent children for females also weakens the role of state dependence as a determinant of longer term unemployment.

IV Conclusion
The results from estimation of a split population duration model indicate a significant difference between the short duration and long duration unemployed which can be related to a number of labour market and demographic characteristics. Females have an increased risk of being amongst the longer duration unemployed if they are less than 25 years of age, face relatively low market wages and have dependent children. Longer spells of short term unemployment (unemployment which lasts for less than one year)
are experienced by women older than 25, by unmarried women, by women with lower non-wage incomes and by women from English speaking backgrounds. Women with occupations in administrative, management or professional fields have significantly shorter spells of short term unemployment.

Males are more likely to be long term unemployed if they face low market wages, are unmarried, were previous employed in the public sector, have high non-wage incomes or are aged between 18 and 24. Their duration of short term unemployment is increased if they are unmarried, face low market wages, are older than 29, have dependent children, or are from a non-English speaking background. Male short term unemployment is also significantly less for those with occupations in administrative, management or professional fields, and for those engaged in further education.

There is no support for the existence of state dependence in short term unemployment and the dominance of certain characteristics among the longer term unemployment weakens the argument in favour of state dependence as an important factor generating longer term unemployment. Longer term unemployment appears to be concentrated among particular groups of individuals and to be related to an important change in the structure of employment, namely the large fall in public sector employment for males. This suggests that public sector employees be given special counselling and training before they leave their jobs to ensure they are aware of conditions in the labour market outside of the public sector and are able to effectively go about searching for further employment. Similarly, young people and women with children deserve special attention in more general training programs aimed at reducing long term unemployment.
References


## Appendix

### Table A1: Demographic and employment characteristics (full sample)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ln (average weekly wage) ( \text{sd} )</td>
<td>2.01 (0.80)</td>
<td>2.13 (0.78)</td>
</tr>
<tr>
<td>Mean (median) weekly non-wage income = y</td>
<td>177 (231)</td>
<td>122 (218)</td>
</tr>
<tr>
<td>Per cent aged 18-24 years</td>
<td>42.1</td>
<td>35.2</td>
</tr>
<tr>
<td>Per cent married</td>
<td>43.5</td>
<td>49.5</td>
</tr>
<tr>
<td>Dep children</td>
<td>34.2</td>
<td>34.5</td>
</tr>
<tr>
<td>Per cent from Aust/English background</td>
<td>81.6</td>
<td>81.6</td>
</tr>
<tr>
<td>Per cent currently studying</td>
<td>14.8</td>
<td>12.0</td>
</tr>
<tr>
<td>Per cent previously employed in public sector</td>
<td>17.3</td>
<td>11.0</td>
</tr>
<tr>
<td>Per cent previously employed as managers/administrators, professionals or para-professional</td>
<td>14.7</td>
<td>15.0</td>
</tr>
<tr>
<td>Average weeks unemployed during year ( \text{sd} )</td>
<td>15.8 (13.7)</td>
<td>17.6 (13.5)</td>
</tr>
<tr>
<td>( n )</td>
<td>819</td>
<td>1040</td>
</tr>
</tbody>
</table>

### Table A2: Demographic and employment characteristics (censored observations)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ln (average weekly wage) ( \text{sd} )</td>
<td>1.61 (1.05)</td>
<td>1.94 (0.99)</td>
</tr>
<tr>
<td>Mean (median) weekly non-wage income = y</td>
<td>275 (277)</td>
<td>143 (198)</td>
</tr>
<tr>
<td>Per cent aged 18-24 years</td>
<td>42.7</td>
<td>38.0</td>
</tr>
<tr>
<td>Per cent married</td>
<td>39.7</td>
<td>42.7</td>
</tr>
<tr>
<td>Dep children</td>
<td>40.8</td>
<td>32.9</td>
</tr>
<tr>
<td>Percent from Aust/English background</td>
<td>82.1</td>
<td>83.6</td>
</tr>
<tr>
<td>Per cent currently studying</td>
<td>22.1</td>
<td>10.7</td>
</tr>
<tr>
<td>Per cent previously employed in public sector</td>
<td>14.1</td>
<td>10.1</td>
</tr>
<tr>
<td>Per cent previously employed as managers/administrators, professionals or para-professional</td>
<td>11.1</td>
<td>10.4</td>
</tr>
<tr>
<td>Average weeks unemployed during year ( \text{sd} )</td>
<td>22.1 (15.2)</td>
<td>23.7 (14.6)</td>
</tr>
<tr>
<td>( n )</td>
<td>262</td>
<td>347</td>
</tr>
</tbody>
</table>
Table A3: Description of variables used in analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>wage</td>
<td>log(average hourly wage)</td>
</tr>
<tr>
<td></td>
<td>if currently employed, average hourly wage = current weekly market earnings/weekly hours worked; else = annual market earnings/annual hours worked</td>
</tr>
<tr>
<td>y</td>
<td>non-wage income</td>
</tr>
<tr>
<td></td>
<td>married = income from government cash benefits + spouse’s income</td>
</tr>
<tr>
<td></td>
<td>not married = income from government cash benefits + other non-earned income</td>
</tr>
<tr>
<td></td>
<td>other non-earned income = income from interest, dividends, rent, and superannuation</td>
</tr>
<tr>
<td>age</td>
<td>dummy variable: 1 = aged between 18-24 years</td>
</tr>
<tr>
<td>dep children</td>
<td>dummy variable: 1 = dependent children present</td>
</tr>
<tr>
<td>Aust/English</td>
<td>dummy variable: 1 = Australian or English</td>
</tr>
<tr>
<td>current study</td>
<td>dummy variable: 1 = currently studying</td>
</tr>
<tr>
<td>public sector</td>
<td>dummy variable: 1 = previously employed in the public sector</td>
</tr>
<tr>
<td>occupation</td>
<td>dummy variable: 1 = previously employed as manager, professional or para-professional</td>
</tr>
</tbody>
</table>

Table A4: Results from semi-parametric duration model  
(Cox proportional hazard model)

<table>
<thead>
<tr>
<th>variables</th>
<th>females</th>
<th>males</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>age</td>
<td>0.12 (0.10)</td>
<td>*0.18 (0.09)</td>
<td></td>
</tr>
<tr>
<td>marital status</td>
<td>*0.27 (0.09)</td>
<td>*0.22 (0.11)</td>
<td></td>
</tr>
<tr>
<td>dep children</td>
<td>-0.14 (0.11)</td>
<td>*-0.19 (0.11)</td>
<td></td>
</tr>
<tr>
<td>Aust/English</td>
<td>*-0.21 (0.11)</td>
<td>-0.15 (0.09)</td>
<td></td>
</tr>
<tr>
<td>current study</td>
<td>-0.15 (0.14)</td>
<td>*0.35 (0.12)</td>
<td></td>
</tr>
<tr>
<td>public sector</td>
<td>0.02 (0.11)</td>
<td>-0.06 (0.12)</td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td>*0.21 (0.12)</td>
<td>*0.30 (0.11)</td>
<td></td>
</tr>
<tr>
<td>wage</td>
<td>*0.48 (0.06)</td>
<td>*0.39 (0.05)</td>
<td></td>
</tr>
<tr>
<td>y</td>
<td>*-0.001 (0.0003)</td>
<td>-*0.0007 (0.0003)</td>
<td></td>
</tr>
<tr>
<td>log-likelihood</td>
<td>-3248.25</td>
<td>-4252.96</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>819</td>
<td>1040</td>
<td></td>
</tr>
<tr>
<td>censored</td>
<td>262</td>
<td>347</td>
<td></td>
</tr>
</tbody>
</table>

* significant at 10 per cent or less.  
(asymptotic standard errors in parenthesis)
### Table A5: Results from lognormal parametric duration model, 
probability of eventual employment = $\delta = 1$

<table>
<thead>
<tr>
<th>variables</th>
<th>females</th>
<th>males</th>
</tr>
</thead>
<tbody>
<tr>
<td>constant</td>
<td>*3.65 (0.17)</td>
<td>*3.69 (0.16)</td>
</tr>
<tr>
<td>age</td>
<td>-0.07 (0.11)</td>
<td>-0.26 (0.09)</td>
</tr>
<tr>
<td>marital status</td>
<td>*0.26 (0.11)</td>
<td>*0.29 (0.10)</td>
</tr>
<tr>
<td>dep children</td>
<td>*0.22 (0.11)</td>
<td>*0.25 (0.10)</td>
</tr>
<tr>
<td>Aust/English</td>
<td>0.20 (0.12)</td>
<td>*0.17 (0.10)</td>
</tr>
<tr>
<td>current study</td>
<td>-0.03 (0.13)</td>
<td>*0.35 (0.12)</td>
</tr>
<tr>
<td>public sector</td>
<td>0.03 (0.13)</td>
<td>-0.64 (0.11)</td>
</tr>
<tr>
<td>occupation</td>
<td>-0.23 (0.14)</td>
<td>*-0.34 (0.11)</td>
</tr>
<tr>
<td>wage</td>
<td>*-0.57 (0.06)</td>
<td>*-0.37 (0.05)</td>
</tr>
<tr>
<td>y</td>
<td>*0.0006 (0.0002)</td>
<td></td>
</tr>
</tbody>
</table>

log-likelihood    -1056.67  -1305.70
$\sigma$           *1.19 (0.03)  1.13 (0.04)
$\lambda$         0.07 (0.003)  0.06 (0.002)
n              819            1040
n               262            347

* significant at 10 per cent or less. (asymptotic standard errors in parenthesis)

### Table A6: Results from parametric split population duration model, 
probability of eventual employment = $\delta \leq 1$ (females)

<table>
<thead>
<tr>
<th>variables</th>
<th>equation for eventual re-employment</th>
<th>equation for duration given eventual re-employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>constant</td>
<td>-0.58 (0.45)</td>
<td>*2.59 (0.22)</td>
</tr>
<tr>
<td>age</td>
<td>*1.06 (0.41)</td>
<td>*-0.22 (0.11)</td>
</tr>
<tr>
<td>marital status</td>
<td>0.33 (0.30)</td>
<td>*-0.34 (0.12)</td>
</tr>
<tr>
<td>dep children</td>
<td>*0.80 (0.33)</td>
<td>0.08 (0.12)</td>
</tr>
<tr>
<td>Aust/English</td>
<td>-0.27 (0.34)</td>
<td>*0.30 (0.13)</td>
</tr>
<tr>
<td>current study</td>
<td>*0.78 (0.38)</td>
<td>-0.23 (0.14)</td>
</tr>
<tr>
<td>public</td>
<td>-0.52 (0.48)</td>
<td>0.10 (0.13)</td>
</tr>
<tr>
<td>occupation</td>
<td>0.35 (0.47)</td>
<td>*-0.39 (0.14)</td>
</tr>
<tr>
<td>wage</td>
<td>*-1.26 (0.23)</td>
<td>-0.04 (0.08)</td>
</tr>
<tr>
<td>y</td>
<td>*0.003 (0.0005)</td>
<td>*-0.0006 (0.0003)</td>
</tr>
</tbody>
</table>

log-likelihood    -1017.93
$\sigma$           1.07 (0.04)
$\delta$          0.86 (0.024)
$\lambda$         0.09 (0.005)
n              819            1040
n               262            347

* significant at 10 per cent or less. (asymptotic standard errors in parenthesis)
Table A7: Results from parametric split population duration model, probability of eventual employment = δ ≤ 1 (males)

<table>
<thead>
<tr>
<th>variables</th>
<th>equation for eventual re-employment</th>
<th>equation for duration given eventual re-employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>constant</td>
<td>-0.05 (0.56)</td>
<td>*3.15 (0.20)</td>
</tr>
<tr>
<td>age</td>
<td>*1.43 (0.51)</td>
<td>*-0.37 (0.10)</td>
</tr>
<tr>
<td>marital status</td>
<td>*-1.93 (0.46)</td>
<td>*-0.28 (0.11)</td>
</tr>
<tr>
<td>dep children</td>
<td>0.43 (0.52)</td>
<td>*0.22 (0.10)</td>
</tr>
<tr>
<td>Aust/English</td>
<td>*-0.15 (0.56)</td>
<td>*0.17 (0.10)</td>
</tr>
<tr>
<td>current study</td>
<td>-0.69 (0.65)</td>
<td>*-0.27 (0.13)</td>
</tr>
<tr>
<td>public</td>
<td>*1.17 (0.57)</td>
<td>0.20 (0.13)</td>
</tr>
<tr>
<td>occupation</td>
<td>-1.33 (1.23)</td>
<td>*-0.32 (0.11)</td>
</tr>
<tr>
<td>wage</td>
<td>*-1.55 (0.32)</td>
<td>*-0.13 (0.07)</td>
</tr>
<tr>
<td>y</td>
<td>*0.002 (0.0007)</td>
<td>0.000005 (0.00001)</td>
</tr>
</tbody>
</table>

log-likelihood  -1284.14
σ                *1.09 (0.01)
δ                0.94 (0.002)
λ                0.06 (0.003)
n                1040

censored        347

* significant at 10 per cent or less.
(Asymptotic standard errors in parenthesis)
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