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ABSTRACT

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This study examines individuals' unemployment experiences from the age of 18 up to the age of 35 using a large panel of administrative records on unemployment related benefit claims of men in the United Kingdom over the past two decades. The main focus is on the extent to which individuals' unemployment experiences are affected by regional and skill differences, i.e. individual heterogeneity, and the business cycle. In particular this study analyses the extent to which repeated unemployment is experienced by individuals who are not able to get stable employment and individuals who hold several jobs interrupted with spells of unemployment before obtaining stable employment. The results provide new insights into the long-term benefits of a labour market program aimed at increasing the employability of the unemployed and getting them into work, such as the New Deal in the UK.

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1. Introduction

Most unemployed have experienced unemployment before (Akerlof and Main, 1980, and Arulampalam et al., 2000) and individuals who experience unemployment early in life are more likely to experience further unemployment later in life (Gregg, 2001). Based on this it is commonly argued that a labour market program aimed at increasing the employability of the young unemployed and getting them into work will yield both short and long-term benefits. An example of such a program is the New Deal for young people in the United Kingdom (Bell et al., 1999, www.newdeal.gov.uk). Understanding individuals' lifecycle unemployment experiences is crucial in the discussion of the potential benefits from such a program. However, mainly due to data restrictions, empirical research on the individuals' lifecycle unemployment experiences is virtually absent. This study contributes to the empirical literature by analysing individuals' unemployment experiences in the first half of their working life and the extent to which the duration and incidence of unemployment are affected by individual heterogeneity and the business cycle. In particular this study analyses the extent to which repeated unemployment is experienced by individuals who are not able to get stable employment and individuals who hold several jobs interrupted with spells of unemployment before obtaining stable employment. This provides new insights as to who among the young unemployed are most likely to benefit in the long-term from the New Deal program.

Microeconometric studies of individuals' unemployment experience mostly analyse single spells of unemployment. Since the seminal work of Lancaster (1979) and Nickell (1979) one of the major issues in the econometric analysis of individuals' unemployment durations is the distinction between genuine duration dependence and individual heterogeneity.[1] As is well known, both genuine duration dependence and individual heterogeneity can explain the commonly observed decrease in the probability of leaving unemployment with the elapsed duration in unemployment, i.e. the so-called negative duration dependence. Over time, hence during unemployment, the macroeconomic situation changes and this may affect individuals' probability of leaving unemployment (Layard et al., 1991, Chap. 5). This is referred to as the effect of the business cycle. Dynarski and Sheffrin

(1990) and Baker (1992), using U.S. data, show that during an economic recession the individuals' probability of leaving unemployment is lower than during an economic upturn, hence durations of unemployment increase during an economic recession. In addition the business cycle may affect the probability of becoming unemployed (Burgess, 1992). Disentangling individual heterogeneity and genuine duration dependence is also of importance in understanding the cyclical variation in the unemployment rate and the average duration of unemployment. In particular, if genuine negative duration dependence is associated with a loss of skills this may explain partially the observed slow adjustment of the labour market after a negative shock in employment (Henry and Nixon, 2000, and Pissarides, 1992). Persistency in aggregate unemployment may also be the result of a job loss that may trigger a pattern of repeated unemployment because of difficulties finding immediately a new stable job (Hall, 1995).

For the empirical analysis this paper uses administrative data on individual unemployment related benefit claims covering 132,492 claims of 38,530 men from the fourth quarter in 1982 up to the first quarter in 1998. The sample is restricted to men who have been unemployed at least once and turned 18 years of age during the sampling period. These individual-level data are unique in the sense that the number of observations is large in both the time and cross-section dimensions. This allows us to make a significant contribution to the empirical literature on unemployment dynamics[2]: (i) Individuals are followed from the age of 18 for up to 16 years. This makes it possible to investigate if the incidence of unemployment decreases with age, i.e. the extent to which individuals need several jobs before stable employment is found. This also provides insight in the accumulated durations in unemployment of individuals at a given age. (ii) The observation period covers more than one business cycle which makes it possible to investigate the way the business cycle affects the individuals' probabilities of entering and leaving unemployment. This provides insights in the cyclical behaviour of aggregate flows both into and out of unemployment (Mortensen, 1994) and the

[1] For excellent literature surveys I refer to Lancaster (1990) and Layard et al. (1991).

[2] Studies exploiting individual-level data are usually characterised by a short calendar time-span and, in case of using survey panel data, a relatively small number of transitions in and out of unemployment (Arulampalam et al., 2000, and Steiner, 2001). This makes it almost impossible to disentangle business cycle effects from the pattern of genuine duration dependence and, more importantly, examine issues concerning lifecycle unemployment experiences.

extent to which a negative employment shock may trigger a pattern of repeated unemployment (Hall, 1995). (iii) The effect of previous unemployment experience on the probability of leaving unemployment and on the probability of re-entering unemployment after having found employment is investigated. This latter issue is sometimes referred to as scarring or lagged duration dependence (Heckman and Borjas, 1980). (iv) Regional differences in the durations of unemployment and the patterns of repeated unemployment are investigated to gain insight in the traditional North-South unemployment divide in the UK (Jackman and Savouri, 1999).

The paper is organized as follows: Section 2 describes the data extensively. Section 3 formulates the econometric model and discusses the estimation procedure and identification issues. Section 4 reports and discusses the estimation results. To facilitate the discussion of the results simulations are carried out. Section 5 summarizes and concludes.

2. The Data: Joint Unemployment and Vacancy Operating System (JUVOS).[3]

The JUVOS is a five percent sample of all computerized claims for unemployment related benefits in the UK from the fourth quarter in 1982 onwards. In the UK this claim-related measure of unemployment is often referred to as the Claimant Count. A JUVOS record consists of the start and end date of the claim. Furthermore, information is gathered on individuals' gender and date of birth, and the region in which the claim is made. The eleven regions considered are the standard regions as defined in Sweeney (1996): 'South East' (including Greater London), 'South West', 'East Anglia', 'East Midlands', 'West Midlands', 'North West', 'Yorkshire and Humberside', 'North', 'Scotland', 'Wales' and 'Northern Ireland'. Individuals in the region 'Northern Ireland' are included only from the first quarter of 1994 onwards.

2.1 Definitions of Unemployment and Employment

[3] See Sweeney (1996) and Ward and Bird (1995) for further descriptive information on the JUVOS.

In principle the sample includes all individuals who make a claim for unemployment benefits, Income Based Job Seekers Allowance[4] or National Insurance credits, and have a National Insurance number that ends in specific pairs of digits. The UK welfare system is as such that an individual who becomes unemployed and has paid enough National Insurance Contributions is entitled to benefits up to twelve months. The period of entitlement has been reduced to a maximum of six months in October 1996. These insurance-based benefits are not means tested. Individual who are not entitled to these benefits or individuals who exhaust these benefits are eligible for means tested benefits nowadays known as Income Based Job Seekers Allowance. This allowance is part of the UK welfare system and, as long as the mean tested criteria is met, has an indefinite duration. In short, in this study unemployment is defined as claiming unemployment related benefits.

From 1982 the JUVOS is updated continuously and monthly the National Statistics publishes unemployment rates based on the JUVOS. Until recently the Claimant Count based on the JUVOS has been accepted as the measure of UK unemployment. Recently the Claimant Count as the official unemployment measure has been questioned and, in line with international standards, the unemployment rate as defined by the International Labour Organisation (ILO) has gained popularity. According to the ILO definition an individual is unemployed if he or she is currently without employment but would like to be employed. Nickell (1999) provides a comparison of the Claimant Count and ILO measures of unemployment. Especially for women the two measures provide strikingly different unemployment rates. The main reason for this is that women who are searching for a job may have a partner with income; hence she does not pass the means tested criterion for receiving Income Based Job Seekers Allowance. Individuals who claim benefits and are not actively searching for a job are included in the Claimant Account but not in the ILO measure of unemployment and Nickell (1999) shows that this causes mainly during an economic recession some discrepancy between the two unemployment measures. Claimants who are discouraged to search for a job may explain this. Having said this, this study uses the Claimant Count (JUVOS) because of the detailed information on individuals' durations of unemployment over considerable length of time. Such detailed individual level information is not available in data from which one can construct the

[4] This is previously known as unemployment related income support.

ILO unemployment rates such as the UK Labour Force Survey (Nickell, 1999). To take the concerns discussed above into account the sample used in this study is restricted to men.

In this study employment is defined as not being in unemployment. Using the JUVOS of 1995 and 1996 Sweeney (1996) shows that roughly 80% of men who leave unemployment move into employment[5] and the majority of the remaining 20% starts claiming sickness related benefits or income support or starts some form of training. Unfortunately, these distinctions cannot be made over the whole sampling period. Hence, issues like the rise in inactivity over the last two decades cannot be analysed in this study (Gregg and Wadsworth, 1999). However, the empirical analysis in this study is restricted to young men for which inactivity is less likely to be an alternative.

2.2 Sample Selection

Only one-fifth of the JUVOS data is available for this research, i.e. a one percent sample of all claims for unemployment related benefits in the UK up to December 1999. Individuals are included if they have a National Insurance number that ends in a specific pair of digits. This sampling scheme yields a random and representative stock sample of the unemployed population at any point in time over the observation period.

The inclusion criteria for the count of unemployment related benefit claims have changed somewhat over the past two decades (Research and Evaluation Division of the Department for Education and Employment, 1995). In order to keep a consistent definition of an unemployment claim over the observation period, several sample selections are made accordingly. The 1983 Budget provisions enable men aged 60 and over and mostly whom considered themselves to be retired, to receive national insurance credits or supplementary benefit without attending an Unemployment Benefit office, hence do not sign on and are no longer present in the JUVOS. For this reason, men over 59 are excluded from the sample. The observation is censored in case the individual turns 60 during the period of claim. In September 1988, the 1988 Social Security Act changed the benefit entitlement of the under 18-year-olds. This group no longer needs to sign on as unemployed in order

[5] Here I use Table 2 of Sweeney (1996) and include the ones who are assumed to have found a job as being employed, i.e. the category ‘failed to sign’.

to receive benefits. In line with the official unemployment figures published by National Statistics, individuals under 18 throughout the sampling period are removed from the sample. After April 1998 many long-term unemployed have entered the New Deal program, a government-supported training and reemployment program targeted at getting the long-term unemployed back into employment (Bell et al. 1999). In the first four months after joining this program, the so-called Gateway, the unemployed are still registered as claimants. Once in subsidized jobs or training courses the claimants are no longer registered as unemployed while they may still be considered unemployed. The New Deal program significantly affects the probability of leaving unemployed only for a specific non-random group of individuals and although the program selection rules are clear it is not actually observed who participates, what type of support they get and whether or not they found employment. For this reason, all spells are censored at April 1998. Selecting individuals aged 18-59 years over the period 1982.IV-1998.I yields 608,087 spells of unemployment. Overlapping spells of unemployment are the main cause for inconsistencies in the data (4%). Inconsistent gender coding affects 0.2% of the sample. These inconsistencies are removed from the sample. As discussed in section 2.1 the sample used in the investigation is restricted to men and this causes a further 34% reduction in the number of spells of unemployment. This is about a 0.96% representative sample of the population unemployed men aged 18-59 years.

As mentioned in the introduction, this study investigates lifecycle unemployment experiences. For this purpose the entire unemployment history of an individual needs to be observed. For this reason the sample is restricted to individuals who are 18 years or younger in 1982.IV. Effectively this means that all individual born before 1964.IV are removed from the sample. As mentioned before individuals in the region 'Northern Ireland' are included in the JUVOS only from the first quarter of 1994 onwards, hence individuals living in Northern Ireland and born before 1976.I are removed from the sample. This selection biases the resulting sample towards the young unemployed. Furthermore all spells of unemployment are removed that started before 1982.IV and before the individual turned 18. For individuals living in Northern Ireland unemployment spells are removed that started before 1994.I. Hence, the empirical analysis is carried out on a flow sample in order to obtain consistent estimates of the parameters of the distribution of durations (Lancaster,

1990, section 3.1). The resulting flow sample consists of 38,530 men over the period 1982.IV-1998.I who make up for 132,492 spells of unemployment. Only 3.5% of these are right-censored (incomplete spells). For all these individuals the complete unemployment history from the age of 18 up to 1998.I is observed. The period before the first spell of unemployment is observed for all 38,530 individuals since being unemployed at least once is a requirement for being in the sample. An individual may experience more than one spell of unemployment and between spells of unemployment it is assumed the individual is employed (section 2.1). In total 127,837 spells of employment between spells of unemployment or after the last observed spell of unemployment are observed of which 26% are right-censored.

2.3 Descriptive Statistics.

Figure 1 reports on the number of unemployed individuals in the sample over the period 1982.IV-1998.I. Individuals are followed from the age of 18 and as the sample size grows over time a more representative picture of the population of the unemployed emerges. The increase in sample size is not monotonically which is largely due to the effect of the business cycle on the flows into and out of unemployment. For example, the number of claimants increases rapidly during the recession years in the early 1990's. Figure 2 reports on the average elapsed duration. The pattern of elapsed duration over the business cycle is in line with descriptive statistics in Layard et al. (1991, Chap 5). During the recession years in the early 1990's elapsed durations increase rapidly. From 1993 onwards unemployment decreases while elapsed duration increases. This may be explained by a selection based on elapsed duration: the ones with the shortest durations leave first. Figure 3 reports on the percentage of new claimants, i.e. the inflow, and the number of individuals that stop claiming, i.e. the outflow (as a percentage of the number of unemployed). The patterns show large variation until the late 1980's. From the early 1990's the pattern is clearer: periods of high unemployment are preceded by periods in which the inflow exceeds the outflow and periods of low unemployment are preceded with periods in which the outflow exceeds the inflow. Figure 4 reports the Kaplan-Meier estimates of the hazard of becoming unemployed for the first time, the hazard of leaving unemployment and the hazard of leaving employment. The probability of becoming unemployed for the first time appears to

be relatively constant with age. The pattern of negative duration dependence in unemployment is in line with Layard et al. (1991, p.226) who use male unemployment durations in 1985 albeit that the negative duration dependence they report appears to be a bit stronger than the one shown here. The probability of leaving employment and again becoming unemployed decreases rapidly in the first two years and remains fairly constant thereafter. Figure 5 shows repeated unemployment of individuals over the sampling period. The striking feature is that the proportion of unemployed that has experienced more than three unemployment spells rises over the sampling period to about 50% in 1998. The percentage of the unemployed who are in their first spell of unemployment in 1998 is only about 20%. This underlines the importance of repeated unemployment and the need to investigate the employment behaviour of the (ex-) unemployed.

As will be discussed in section 3.5, a series of Gross Domestic Product (GDP) is used as a macroeconomic indicator to control for business cycle effects. Figure 6 reports on both the national unemployment rates and detrended (logarithm of) GDP per quarter. Important for this study is the fact that the time span of the sample includes more than one entire economic cycle.

3. The Econometric Model: a Multiple Spell Proportional Hazard Model

The econometric framework chosen to model the individuals' probabilities of entering and leaving unemployment is a multiple spell proportional hazard model (Honoré, 1993). This is considered to be a reduced-form approach and such an approach is taken in most empirical studies that analyse individuals' unemployment durations. I refer to Lancaster (1990) for an excellent overview of the literature on the usage of these models and the linkage with the economic framework of job search theory.

Sections 3.1 to 3.3 describe the necessary ingredients of the likelihood function, which is set up in section 3.4. Section 3.5 discusses the empirical specifications of the hazard rate functions.

3.1 Leaving Unemployment

The number of unemployment spells experienced by individual i is denoted by K_i, the starting date of the k^{th} unemployment spell is denoted by τ_{ik}, the duration of the k^{th} unemployment spell by t_{ik} and c_{ik} is a dummy variable equal to 1 if the k^{th} unemployment spell is right-censored and equal to 0 otherwise. X_{ik} is a vector of observed individual characteristics, which are constant within a spell but may vary across spells. The unobserved individual specific characteristic is denoted by ν_i and is assumed to be constant across spells.

As mentioned above, a proportional hazard specification is employed to model the individuals' labour market transitions. The hazard rate of a transition from unemployment into employment, i.e. the instantaneous conditional probability of leaving unemployment, is denoted by $h_1(t_{ik} \mid \tau_{ik}, X_{ik}, \upsilon_i; \beta)$ where β is a parameter vector. The density function of the duration in unemployment, i.e. t_{ik}, is given by (Lancaster, 1990):

$$g_1(t_{ik} \mid \tau_{ik}, X_{ik}, \nu_i; \beta) = h_1(t_{ik} \mid \tau_{ik}, X_{ik}, \nu_i; \beta) \exp\left\{-\int_0^{t_{ik}} h_1(s \mid \tau_{ik}, X_{ik}, \nu_i; \beta) ds\right\}.$$

The likelihood contribution for a right-censored spell is the survival function:

$$\bar{G}_1(t_{iK_i} \mid \tau_{iK_i}, X_{iK_i}, \nu_i; \beta) = \exp\left\{-\int_0^{t_{iK_i}} h_1(s \mid \tau_{iK_i}, X_{iK_i}, \nu_i; \beta) ds\right\}.$$

Only the last observed spell can be right-censored.

3.2 Leaving Employment

The time in employment is defined as the time in between spells of unemployment or the time after leaving unemployment (see section 2.1). Using the notation of section 3.1, the hazard rate out of employment is denoted by $h_2(\tau_{ik+1} - (\tau_{ik} + t_{ik}) \mid (\tau_{ik} + t_{ik}), X_{ik}, \upsilon_i; \gamma)$ where γ is a parameter vector. The density function of an employment spell is given by:

$$g_2(\tau_{ik+1} - (\tau_{ik} + t_{ik}) \mid (\tau_{ik} + t_{ik}), X_{ik}, \upsilon_i; \gamma) = h_2(\tau_{ik+1} - (\tau_{ik} + t_{ik}) \mid (\tau_{ik} + t_{ik}), X_{ik}, \upsilon_i; \gamma)$$
$$\times \exp\left\{-\int_0^{\tau_{ik+1} - (\tau_{ik} + t_{ik})} h_2(s \mid (\tau_{ik} + t_{ik}), X_{ik}, \upsilon_i; \gamma) ds\right\}.$$

The date of censoring is denoted by τ_{if} and is for all individuals equal to 1998I. The likelihood contribution for a right-censored employment spell is the survival function:

$$\bar{G}_2(\tau_{if} - (\tau_{iK_i} + t_{iK_i}) \mid (\tau_{iK_i} + t_{iK_i}), X_{iK_i}, \upsilon_i; \gamma) =$$

$$\exp\left\{-\int_0^{\tau_{if} - (\tau_{iK_i} + t_{iK_i})} h_2(s \mid (\tau_{iK_i} + t_{iK_i}), X_{iK_i}, \upsilon_i; \gamma) ds\right\}.$$

An employment spell is right-censored if the last observed unemployment spell of the individual is not right-censored, i.e. $c_{K_i} = 0$.

3.3 Initial Conditions: Becoming Unemployed for the First Time.

The duration until an individual becomes unemployed for the first time is defined as the duration from the date the individual turned 18 until the individual becomes unemployed for the first time. The date at which the individual turned 18 is denoted by τ_{i0}. Using the notation of section 3.1, the hazard rate into the first spell of unemployment is denoted by $h_0(\tau_{i1} - \tau_{i0} \mid \tau_{i0}, X_{i1}, \upsilon_i; \alpha)$, where α is a parameter vector. The corresponding density function is given by:

$$g_0(\tau_{i1} - \tau_{i0} \mid \tau_{i0}, X_{i1}, \upsilon_i; \alpha) = h_0(\tau_{i1} - \tau_{i0} \mid \tau_{i0}, X_{i1}, \upsilon_i; \alpha)$$

$$\times \exp\left\{-\int_0^{\tau_{i1} - \tau_{i0}} h_0(s \mid \tau_{i0}, X_{i1}, \upsilon_i; \alpha) ds\right\}$$

For all individuals in the sample the first spell of employment ends in unemployment, thus there are no right-censored spells. These initial spells are treated differently from the employment spells that occur after a spell of unemployment because many individuals are still in school at the age of 18 and some individuals may actually have already experienced unemployment before signing on after the age of 18 (see section 2.2). For this reason this first 'employment' spell may more appropriately be referred to as the initial spell or initial condition.

3.4 The Likelihood function and Maximum Likelihood Estimator

For each individual the set of observations is denoted by $H_i = \left\{\tau_{i0}, \tau_{ik}, t_{ik}, c_{ik}, \tau_{if}, X_{ik}\right\}_{k=1,..,K_i}$ and the entire sample is denoted by $H = \left\{H_i\right\}^{i=1,..,N}$. As mentioned before, unobserved individual specific heterogeneity is denoted by ν_i. A support point approach as described in Heckman and Singer (1984)

is used in this study and I refer to Huh and Sickles (1994) for an excellent discussion on the empirical implementation of this method and the comparison with alternative parametric approaches, and to Honoré (1993) and Baker and Melino (2000) for further discussion on identification issues. The number of mass points is assumed to be fixed and equal to P. The mass points are denoted by v_p and the corresponding probability mass is given by $\Pr\left(v_i = v_p\right) = \pi_p$. Using the mass point distribution and the ingredients described in sections 3.1, 3.2 and 3.3, the likelihood function for a sequence of spells of individual i is given by:

$$
\begin{aligned}
L_i(H_i \mid \theta) = \sum_{p=1}^{P} \big(& g_0(\tau_{i1} - \tau_{i0} \mid \tau_{i0}, X_{i1}, v_i; \alpha) \big) \\
& \times \left(\prod_{k=1}^{K_i} \left[g_1(t_{ik} \mid \tau_{ik}, X_{ik}, v_i; \beta) \right]^{1-c_{ik}} \left[\bar{G}_1(t_{ik} \mid \tau_{ik}, X_{ik}, v_i; \beta) \right]^{c_{ik}} \right) \\
& \times \left(\prod_{k=1}^{K_i - 1} \left[g_2(\tau_{ik+1} - (\tau_{ik} + t_{ik}) \mid (\tau_{ik} + t_{ik}), X_{ik}, v_i; \gamma) \right] \right) \\
& \times \left(\left[\bar{G}_2(\tau_{if} - (\tau_{iK_i} + t_{iK_i}) \mid (\tau_{iK_i} + t_{iK_i}), X_{iK_i}, v_i; \gamma) \right]^{1-c_{iK_i}} \right) \times \pi_p .
\end{aligned}
$$

Where $\theta^T = \left(\alpha^T, \beta^T, \gamma^T, v^T, \pi^T\right)$ is the vector containing all parameters of interest. The sample log-likelihood function is given by:

$$
Ln\big(L(H \mid \theta)\big) = \sum_{i=1,..,n} \ln\big(L_i(H_i \mid \theta)\big).
$$

The Maximum Likelihood estimates are given by:

$$
\hat{\theta} = \arg\max_{\theta} \left\{ Ln\big(L\left(H \mid \theta\right)\big) \right\}
$$

The model has been set up in continuous time. The duration data is discretised in quarterly units and this is taken into account in the estimation procedure. This facilitates the calculations of the integrated hazard functions and makes it feasible to estimate this model using a very large data set. Thus the econometric framework as it has been used is more appropriately referred to as a discrete time hazard rate model.

3.5 The Empirical Specifications

The three hazard rate functions to be estimated are the hazard of leaving unemployment, i.e. $h_1(.)$, the hazard of leaving employment, i.e. $h_2(.)$ and the hazard of becoming unemployed for the first time, i.e. $h_0(.)$. The only observed exogenous covariate available is the region in which the claim is made. This covariate is included in all three hazard rate functions using dummy variables for each region and excluding the dummy variable for the region 'South East'. Table 1 shows that the distribution of unemployment over the region is quite stable over time, apart from a shock that affected some regions more than others in the recession starting in the late 1980's. The vectors of covariates included in $h_0(.)$, $h_1(.)$, and $h_2(.)$ are denoted by, respectively, X_{i1}^0, X_{ik}^1 and X_{ik}^2. If there is more than one unemployment spell observed for an individual, the lagged unemployment duration is included as a covariate in the hazard of leaving unemployment. The lagged unemployment duration is also included as a covariate in the hazard of leaving employment. Duration dependence and calendar time are not separately identified using nonparametric specifications for both (Imbens, 1994) and for this reason business cycle effects are modelled by using a macroeconomic indicator as an additional time-varying covariates. I use a detrended series of the logarithm of the Gross Domestic Product (LNGDP) as a macroeconomic indicator for the economic cycle (see Figure 6).[6] Duration dependence is parameterised by using quarter specific dummy variables, i.e. a semi-parametric specification is chosen to have maximum flexibility in the pattern of duration dependence. The empirical hazard rate function of leaving unemployment is formalised as follows:

$$(1) \qquad \ln(h_1(s \mid \tau_{ik}, X_{ik}^1, \upsilon_i; \beta)) = \beta_0 + \sum_{d=2}^{D} \beta_{1d} I(s=d) + \beta_2 LNGDP_{\tau_{ik}+s} + X_{ik}^1 \beta_3 + \nu_i .$$

The final duration interval is chosen to be equal to 31 quarters and D equal to 32 includes all durations over 31 quarters. The hazards for leaving employment and becoming unemployed for the first time are specified in exactly the same way:

[6] Dynarski and Sheffrin (1990) and Imbens and Lynch (1992) use the national unemployment rate (UR, see Figure 6) as a macroeconomic indicator. Preliminary results indicated that LNGDP basically does a better job explaining the cyclical fluctuations in the probability of leaving unemployment than does UR. This is explained by the fact that LNGDP is a better proxy for labor demand than UR.

(2) $$\ln(h_2(s \mid (\tau_{ik} + t_{ik}), X_{ik}^2, \upsilon_i; \gamma)) = \gamma_0 + \sum_{d=2}^{D} \gamma_{1d} I(s = d) + \gamma_2 LNGDP_{\tau_{ik}+t_{ik}+s} + X_{ik}^2 \gamma_3 + \gamma_4 \nu_i ,$$

and

(3) $$\ln(h_0(s \mid \tau_{i0}, X_{i1}^0, \upsilon_i; \alpha)) = \alpha_0 + \sum_{d=2}^{D} \alpha_{1d} I(s = d) + \alpha_2 LNGDP_{\tau_{i0}+s} + X_{i1}^0 \alpha_3 + \alpha_4 \nu_i ,$$

respectively. The parameters added in these last two hazard functions are the effects of unobserved individual specific heterogeneity on the hazard, i.e. the parameters γ_4 and α_4. In addition, seasonal effects are modelled by including dummy variables for each quarter of the year in all three hazard rate functions. To facilitate the discussion of the results unobserved individual specific heterogeneity is often referred to as (unobserved) skills.

4. Empirical Results

The model as outlined in section 3 is estimated and the estimation results are summarized in Table 2 and Figures 7 and 8. For completeness all parameter estimates are reported in the Appendix (Tables A1, A2 and A3). The baseline hazards reported in the first row in Table 2 are the probabilities of becoming unemployed for the first time, leaving unemployment and leaving employment within one quarter for a reference individual. In this case the reference individual is living in the 'South East', just entered a particular state (i.e. the elapsed duration is equal to one quarter), entered the state in the first quarter of the year and at a time that GDP was at it's trend value (i.e. LNGDP=0, Average Growth), has no previous unemployment experiences or, when in the state of employment, has a previous unemployment experience equal to one quarter, and is low skilled (ν_i=0, the unobserved individual specific component). Thus the percentages reported in Table 2 are percentages of the baseline hazard reported in the first row of the respective column. Given the fact a proportional hazard rate model is used, the effect on the baseline hazard of any combination of characteristics can be made by combining the corresponding percentages.

Genuine Duration Dependence

Table 2 and Figure 7 show that the hazard of becoming unemployed for the first time remains fairly constant with age and that the hazard of leaving unemployment decreases with elapsed duration, i.e. the familiar pattern of negative genuine duration dependence. A long-term unemployment (over two years unemployed) is about half as likely to leave unemployment as a short-term unemployed. While this is a significant difference, the difference is not as large as often reported in the literature. For example, Layard et al. (1991, p.227) report, based on aggregate data from the UK, a one-tenth of a probability of finding a job for a five-year unemployed person relatively to a newly unemployed. The probability of re-entering unemployment, i.e. the hazard of leaving employment, decreases rapidly with elapsed duration, which suggests that once a job has been held for about two years the hazard of becoming again unemployed is very low.

Business Cycle Effects

Figure 8 shows that relatively to times of low growth in times of high growth individuals are more likely to leave unemployment and less likely to enter unemployment. The variation over the business cycle in the hazard of leaving unemployment is slightly higher than that of entering unemployment. These effects are quantified in Table 2: relatively to a situation of high growth, in a situation of low growth an individual is 30% more likely to become unemployed for the first time, 26% more likely to become unemployed again and 30% less likely to leave unemployment. This result is in contrast with the common perception as reported in Layard et al. (1991, p.225) who conclude that changes in UK unemployment over the business cycle are caused largely by changes in the duration of unemployment while the incidence of becoming unemployed remains relatively constant.

The seasonal effects are dominated by individuals who leave school and experience their first spell of unemployment, hence a 46% higher probability of becoming unemployed for the first time in the third quarter.

Lagged Duration Dependence or Scarring Effects

Scarring effects are investigated by including the duration of the previous spell of unemployment in the hazard of leaving unemployment and the hazard of leaving employment (Table 2, duration of the previous spell of unemployment). A short previous spell of unemployment of one quarter increases the hazard of leaving unemployment by 15% but the longer the duration of the previous spell of unemployment the lower the hazard of leaving unemployment. A two-year duration of the previous spell of unemployment decreases the hazard of leaving unemployment by 31%. The effects of the duration of the previous spell of unemployment on the hazard of leaving employment are relatively small (last column): at most 14% for a previous unemployment duration of 6 years.

Regional Variation

Table 2 shows that regional variation in the probability of becoming unemployed for the first time is relatively high. Individuals in the reference region 'South East' have the lowest hazard of entering unemployment and individuals in the North, i.e. regions 'Yorkshire and Humberside', 'North-West', 'North', 'Wales' and to a certain extent 'Scotland', have the highest hazards of entering unemployment for the first time which results in entering unemployment at an early age. For example, the probability of becoming first time unemployed is 41% higher in region 'North' than in the reference region 'South East'. Individuals in 'Northern Ireland' have an extreme high hazard of becoming unemployment for the first time which results in many individuals experiencing unemployment already early in life. No empirical evidence of this sort has been reported elsewhere to verify or dispute this finding.

Once in unemployment, the regional differences in the hazard of leaving unemployment are relatively small and often insignificantly different from the reference region (second column). There is quite some variation in the probability of leaving employment after having been unemployed (third column). Again the traditional North-South divide is apparent. For example, individuals in region 'North' have a 24% higher hazard of re-unemployment after having found employment compared to individuals in region 'South East'.

Unobserved Individual Specific Heterogeneity

As discussed in section 3.4 a discrete mass point approach is taken to model unobserved individual specific heterogeneity that is assumed to be constant over time. As it turns out, three support points suffice under the normalization of one of them being equal to 0.[7] The distribution of unobserved heterogeneity is reported at the bottom of Table 2.

The most striking feature is the heterogeneity in the flow into unemployment. A relatively high skilled individual has a 64% lower hazard rate of becoming unemployed for the first time. In other words, conditional on becoming unemployed at least one time a high skilled worker is more likely to enter unemployment later in life than a low skilled worker. This may simply be attributed to a higher age at schooling completion. Once in unemployment a high skilled worker has only a 14% higher hazard of leaving unemployment. But, more importantly, once back into employment the high skilled worker is 65% less likely to enter unemployment again, relatively to a low skilled worker.

4.1 Lifecycle Unemployment Experiences

Simulations are carried out to gain insight in individuals' unemployment experiences and patterns of repeated unemployment in the early phase of their working life and how these are affected by heterogeneity and the business cycle. I use the estimation results presented in the Appendix to simulate lifecycle unemployment and employment behaviour of individuals from the age of 18 up to the age of 35. These results are conditional on individuals being at risk of experiencing unemployed at least once before the age of 35.

Table 3 reports the results of simulating lifecycle patterns of unemployment experiences for individuals who will be unemployed at least once in their life. The baseline simulation is carried out for an average individual in the sample, i.e. he is living in 'East Midlands', has average skills (ν_i=0.05), and the macroeconomic situation is as such that economic growth is at its trend value (LNGDP=0, Average Growth).[8] The top of Table 3 shows that during the early years of his working life, i.e. up to the age of 35, an average individual has spend about 13 quarters in unemployment and

[7] To be more specific on this, a fourth support point converged to the second support point.

[8] Monte Carlo simulations are carried out for 2000 individuals and 400 replications from the asymptotic distribution around the ML parameter estimates are drawn to construct standard errors.

has entered unemployment almost 5 times. Results not reported here show that virtually all individuals (who will be unemployed at least once) experience their first spell of unemployment before the age of 25. The average individual, who will be unemployed at least once, has a 25% change of being unemployed (fraction in unemployment, third column) at the age of 20 and this percentage decreases to 12% at the age of 35. The average elapsed duration in unemployment increases with age from about 3 quarter at the age of 20 up to 6 quarters at the age of 35. This shows that older individuals have on average longer (elapsed) durations of unemployment due to selection over time: the older unemployed have had more unemployment experiences which results in reinforcing effects on the duration in unemployment through lagged duration dependence and genuine duration dependence. Stable employment (fifth column) is defined as being employed for more than two years. The percentage of the individuals that obtain stable employment after many years and several jobs interrupted with spells of unemployment rises to 69% at the age of 35 but about 31% does not obtain stable employment before the age of 35.

First the traditional North-South divide is examined. Relatively to individuals in the South-East, individuals in the North experience more spells of unemployment (second column) and are more likely to experience unemployment at a young age (third column). Through lagged duration dependence and genuine duration dependence this results in somewhat longer spells of unemployment at all ages for individuals in the North. At the age of 35 an individual in the South has a 22% higher probability of having stable employment (0.72 versus 0.59, fifth column), while the difference in the duration in unemployment is of less importance (6.25 versus 8.26 quarters with low levels of significance in the differences from the Baseline, fourth column).

The differences across levels of skill are large which underlines the importance of controlling for unobserved individual specific characteristics. Low skilled individuals experience almost twice as many unemployment spells and are half as likely as high skilled individuals to be in stable employment at the age of 35 (0.43 versus 0.85, fifth column). The differences in the duration in unemployment are less strong and mostly insignificant. Hence, the differences in the total time spend in unemployment is mainly caused by differences in the number of unemployment spells. This is in

line with results in, for instance, Van den Berg and Van Ours (1994) who report little individual heterogeneity in the durations of unemployment of UK men.

To examine the effects of a change in the macroeconomic environment on individuals' unemployment experiences an experiment is carried out by allowing for either low or high growth (instead of average growth) between the ages of 20 and 25. Hence at the age of 20 there are no differences from the Baseline and all differences at ages over 25 are due to the macroeconomic change that occurred between the ages 20-25. At the age of 25 the probability of being unemployed is 9%-points higher in a situation of low growth than in the baseline situation of average growth (third column). This percentage rapidly decreases to a 1%-point, i.e. an almost total adjustment to the baseline level. A negative economic shock does trigger a pattern of repeated unemployment (second column) but these effects are relatively small. The effects on elapsed durations in unemployment diminish with age and turn insignificant. Overall these results show that the effects of a macroeconomic change as such die out rapidly over time and that the remaining effects are small. There are some feedback effects via genuine duration dependence and lagged duration dependence but the commonly found persistence in negative employment shocks cannot be attributed to this. This is in contrast to suggestions raised in Hall (1995) and Henry and Nixon (2000).

4.2 The New Deal for the Unemployed Youth

The empirical analysis has focussed on the period before the start of the New Deal for the Unemployed Youth that is currently active in the UK. This program is aimed at enhancing the employability of all young people aged 18-24 years old who claim Job Seekers Allowance for two quarters or more (Bell et al. 1999). One way of evaluating the long-term benefits of this program is to examine the proportion of young unemployed who eventually end up in stable employment. A direct evaluation of this program is not possible given the data presently available but the results presented here do provide new insights in some of the possible long-term benefits of such a labour market program.

Virtually all individuals who are unemployed at least once before the age of 35 experience their first spell of unemployment before the age of 25. Hence, targeting the young unemployed may

yield long-term benefits by diminishing the probability of becoming repeatedly unemployed or, equivalently, increasing the proportion of young unemployed who end up in stable employment. The results in section 4.1 show that 69% of a group of average young unemployed eventually get into stable unemployment. The selection criteria for participation in the New Deal are, presumably, aimed at targeting those most at risk not getting stable employment and avoiding spending too many resources on those who would get stable unemployment also without intervention. While all unemployed may of course benefit from participation in the short-term, most of the long-term benefits of the New Deal have to come from the unemployed who are not able to get stable employment without intervention. A selection based on the duration in unemployment is often suggested to be sufficient for this purpose. The New Deal for the Unemployed Youth program follows this in basing its selection on all young unemployed who have been claiming Jobs Seekers Allowance for two quarters or more. The results discussed above show that individual heterogeneity mostly affects the incidence of unemployment and only to a lesser extent the duration in unemployment. This implies that the durations in unemployment is not a good criterion for selecting those unemployed who are least likely to get stable unemployment and, consequently, most likely to benefit from the program in the long-term. This observation prompts serious concerns about the potential efficiency of the program. If, as a consequence, a large proportion of the young unemployed who participate in the program actually do not benefit in the long-term then an evaluation of the New Deal based on the long-term benefits will be biased towards failure. At the same time the long-term benefits for those who do need intervention to get stable employment will be undervalued.

A concern about the costs of the New Deal may arise in times of economic slowdown. The results above show that the duration in unemployment is relatively sensitive with respect to the business cycle. Hence, in an economic slowdown the number of participants in the program will increase while at the same time there is a decrease in the demand for labour. In times of high economic growth most participants get work in the first stage of the New Deal program, the so-called Gateway, and make relatively little use of the more expensive options such as intensive training and subsidised jobs (Dickens et al, 2000). However, in times of economic slowdown the costs of the program will increase not only due to an increase in the number of participants but also due to an

increase in the proportion of participants who do not get work in the first stage of the program, so stay longer on the program and move on to the options such as intensive training or job subsidies. Hence, relatively to times of high economic growth when the program started in 1998, in times of economic slowdown the costs will be higher and, moreover, the efficiency will be even less.

5. Summary and Conclusions

This study investigates individuals' unemployment experiences from the age of 18 up to the age of 35 using administrative data on unemployment related benefit claims of men in the United Kingdom over the past two decades. For the empirical analysis a multiple spell proportional hazard model is used and to gain insight in the estimation results simulations are carried out. The most important empirical results can be summarized as follows:

(i) The descriptive statistics and the results of the baseline simulation (section 4.1) show that repeated unemployment is a dominant feature of the UK labour market. An average unemployed has experienced 5 spells of unemployment and has spent 13 quarters in total in unemployment by the age of 35. Unemployment among young individuals is for 69% caused by individuals who experience several jobs interrupted with spells of unemployment before obtaining stable employment. The other 31% do not obtain stable employment before the age of 35. Through lagged duration dependence and negative genuine duration dependence this selection over time results in the remaining unemployed having on average longer durations of unemployment. The average elapsed duration in unemployment increases from 3 quarters at the age of 20 to 6 quarters at the age of 35. Hence, within a homogeneous group of individuals there is a strong negative relationship between age and the probability of leaving unemployment.

(ii) Individual heterogeneity, modelled as regional differences and skill differences, mainly affects the number of spells of unemployment individuals experience during the first half of their working life. Consequently, the probability of obtaining stable employment varies significantly

across regions and levels of skills. The effects of individual heterogeneity on individuals' durations in unemployment are small and mostly insignificant (Table 3).

(iii) The business cycle is found to affect both the flow into and out of unemployment. Relatively to a situation of high growth, in a situation of low growth an individual is 30% more likely to become unemployed for the first time, 26% more likely to become unemployed again and 30% less likely to leave unemployment.

(iv) The hazard of leaving unemployment decreases with the duration of the previous spell of unemployment, i.e. negative lagged duration dependence. In line with a ranking model of Blanchard and Diamond (1994) this may be explained by employers hiring the applicant with the least accumulated unemployment experience. The effect of the duration of the previous spell of unemployment on the hazard of leaving employment is relatively small (Table 2).

(v) Macroeconomic shocks affect severely both the incidence of unemployment and the duration in unemployment. The effects are however reduced quite rapidly over time. There are some feedback effects via genuine duration dependence and lagged duration dependence but the commonly found persistence in negative employment shocks cannot be attributed to this.

(vi) The main concern with the New Deal for the Unemployed Youth put forward in this study is the fact that selection into the program is based on the duration in unemployment. The results in this study show that individual heterogeneity affects mainly the number of spells of unemployment and, consequently, the probability of obtaining stable employment, and only to a lesser extent the duration in unemployment, see also point (ii). In other words, the duration in unemployment for the young unemployed turns out to be a bad indicator for the probability of getting stable employment later in life. This may yield a high degree of inefficiency of this labour market program: a high proportion of participants would have obtained stable employment also without participating. The costs of the program are predicted to increase substantially in times of economic slowdown because of the countercyclical behaviour of the duration in unemployment. Hence, in the years to come the discussion on making the program more efficient may become prominent. An increase in efficiency can be obtained by using additional criteria for participation. Based on the results in this paper the level of skills is a likely candidate. This can be implemented by using the (educational) qualifications

of the individual. Such an additional selection criterion is used in, for instance, the Welfare to Work programs currently active in the US.

Acknowledgements

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Appendix: Estimation Results

The average log-likelihood function is equal to –16.4. The distribution of unobserved heterogeneity consists of the three support points ν_1=0 (normalisation), ν_2=0.05 (with s.e. 0.01) and ν_3=0.13 (with s.e. 0.02) with probabilities 0.12, 0.51 and 0.37, respectively. The estimation results are reported in Tables A1, A2 and A3. Notation: p.e. is parameter estimate and s.e. is standard error.

Table A1: Estimates of the hazard of entering unemployment for the first time, i.e. equation (3). The dependent variable is the duration of the first spell of employment (see section 3.3).

Covariate	p.e.	s.e.	Covariate	p.e.	s.e.
Constant	-1.69	0.05			
Genuine Duration dependence, Dummy Variables (in Quarters)					
Duration = 1	0.00	-	Duration = 17	-0.28	0.05
Duration = 2	-0.20	0.02	Duration = 18	-0.20	0.05
Duration = 3	-0.21	0.02	Duration = 19	-0.27	0.05
Duration = 4	-0.15	0.03	Duration = 20	-0.29	0.06
Duration = 5	-0.17	0.03	Duration = 21	-0.32	0.06
Duration = 6	-0.25	0.03	Duration = 22	-0.38	0.06
Duration = 7	-0.30	0.03	Duration = 23	-0.39	0.06
Duration = 8	-0.38	0.03	Duration = 24	-0.26	0.06
Duration = 9	-0.45	0.04	Duration = 25	-0.21	0.07
Duration = 10	-0.50	0.04	Duration = 26	-0.28	0.07
Duration = 11	-0.55	0.04	Duration = 27	-0.31	0.07
Duration = 12	-0.46	0.04	Duration = 28	-0.25	0.08
Duration = 13	-0.35	0.04	Duration = 29	-0.17	0.08
Duration = 14	-0.31	0.04	Duration = 30	-0.09	0.08
Duration = 15	-0.29	0.04	Duration = 31	-0.15	0.08
Duration = 16	-0.31	0.05	Duration >31	0.14	0.05
Business Cycle Effects, LNGDP=detrended logarithm of the Gross Domestic Product					
LNGDP	-0.033	0.002			
Seasonal Effects, Dummy Variables					
First Quarter	0.00	-			
Second Quarter	0.13	0.02			
Third Quarter	0.38	0.02			
Fourth Quarter	-0.03	0.02			
Regions, Dummy Variables					
South East	0.00	-			
East Anglia	0.13	0.04	North West	0.30	0.02
South West	0.20	0.03	North	0.34	0.03
West Midlands	0.28	0.02	Wales	0.38	0.03
East Midlands	0.22	0.03	Scotland	0.28	0.02
Yorkshire and Humberside	0.30	0.02	Northern Ireland	0.89	0.12
Unobserved heterogeneity	-7.80	1.49			

Table A2: Estimates of the hazard of leaving unemployment, i.e. equation (1). The dependent variable is the duration in unemployment (see section 3.1).

Covariate	p.e.	s.e.	covariate	p.e.	s.e.
Constant	-0.77	0.02			
Genuine Duration dependence, Dummy Variables (in Quarters)					
Duration = 1	0.00	-	Duration = 17	-1.17	0.09
Duration = 2	-0.26	0.01	Duration = 18	-1.17	0.09
Duration = 3	-0.33	0.01	Duration = 19	-1.32	0.10
Duration = 4	-0.53	0.02	Duration = 20	-1.12	0.11
Duration = 5	-0.55	0.02	Duration = 21	-1.28	0.13
Duration = 6	-0.53	0.02	Duration = 22	-1.47	0.15
Duration = 7	-0.70	0.03	Duration = 23	-1.26	0.14
Duration = 8	-0.91	0.03	Duration = 24	-1.61	0.18
Duration = 9	-0.70	0.03	Duration = 25	-1.15	0.16
Duration = 10	-0.88	0.04	Duration = 26	-1.34	0.19
Duration = 11	-0.95	0.05	Duration = 27	-1.37	0.21
Duration = 12	-1.12	0.05	Duration = 28	-1.42	0.23
Duration = 13	-0.99	0.06	Duration = 29	-1.48	0.26
Duration = 14	-1.13	0.07	Duration = 30	-1.73	0.32
Duration = 15	-1.16	0.07	Duration = 31	-1.88	0.37
Duration = 16	-1.24	0.08	Duration >31	-1.44	0.15
Business Cycle Effects, LNGDP=detrended logarithm of the Gross Domestic Product					
LNGDP	0.044	0.002			
Seasonal Effects, Dummy Variables					
First Quarter	0.00	-			
Second Quarter	0.04	0.01			
Third Quarter	0.18	0.01			
Fourth Quarter	-0.09	0.01			
Regions, Dummy Variables					
South East	0.00	-			
East Anglia	0.08	0.02	North West	-0.04	0.01
South West	0.07	0.01	North	-0.07	0.01
West Midlands	-0.04	0.01	Wales	-0.01	0.02
East Midlands	0.01	0.01	Scotland	0.004	0.01
Yorkshire and Humberside	-0.004	0.01	Northern Ireland	-0.10	0.07
Unobserved heterogeneity	1.00	-			
Lagged Duration Dependence					
The individual had a previous spell of unemployment (Dummy Variable)				0.14	0.01
Ln(Duration of the previous spell of unemployment, in Quarters)				-0.25	0.01

Table A3: Estimates of the hazard of leaving employment, i.e. equation (2). The dependent variable is the duration in employment (see section 3.2).

Covariate	p.e.	s.e.	covariate	p.e.	s.e.
Constant	-1.03	0.04			
Genuine Duration dependence, Dummy Variables (in Quarters)					
Duration = 1	0.00	-	Duration = 17	-2.26	0.05
Duration = 2	-0.35	0.01	Duration = 18	-2.27	0.05
Duration = 3	-0.58	0.01	Duration = 19	-2.43	0.06
Duration = 4	-0.50	0.01	Duration = 20	-2.47	0.06
Duration = 5	-0.94	0.02	Duration = 21	-2.52	0.07
Duration = 6	-1.36	0.02	Duration = 22	-2.66	0.07
Duration = 7	-1.44	0.02	Duration = 23	-2.57	0.07
Duration = 8	-1.31	0.02	Duration = 24	-2.59	0.08
Duration = 9	-1.72	0.03	Duration = 25	-2.85	0.09
Duration = 10	-1.88	0.03	Duration = 26	-2.76	0.09
Duration = 11	-1.84	0.03	Duration = 27	-2.92	0.10
Duration = 12	-1.66	0.03	Duration = 28	-2.83	0.10
Duration = 13	-1.91	0.04	Duration = 29	-2.82	0.10
Duration = 14	-2.12	0.04	Duration = 30	-2.88	0.11
Duration = 15	-2.11	0.04	Duration = 31	-2.99	0.12
Duration = 16	-2.00	0.04	Duration >31	-3.40	0.05
Business Cycle Effects, LNGDP=detrended logarithm of the Gross Domestic Product					
LNGDP	-0.029	0.002			
Seasonal Effects, Dummy Variables					
First Quarter	0.00	-			
Second Quarter	0.09	0.01			
Third Quarter	0.09	0.01			
Fourth Quarter	0.02	0.01			
Regions, Dummy Variables					
South East	0.00	-			
East Anglia	0.09	0.02	North West	0.15	0.01
South West	0.12	0.02	North	0.22	0.02
West Midlands	0.08	0.02	Wales	0.14	0.02
East Midlands	0.08	0.02	Scotland	0.18	0.01
Yorkshire and Humberside	0.18	0.01	Northern Ireland	-0.08	0.10
Unobserved heterogeneity	-8.00	1.40			
Lagged Duration Dependence					
Ln(Duration of the previous spell of unemployment, in Quarters)				0.042	0.006

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Figure 1: The number of unemployment related benefit claims per quarter.

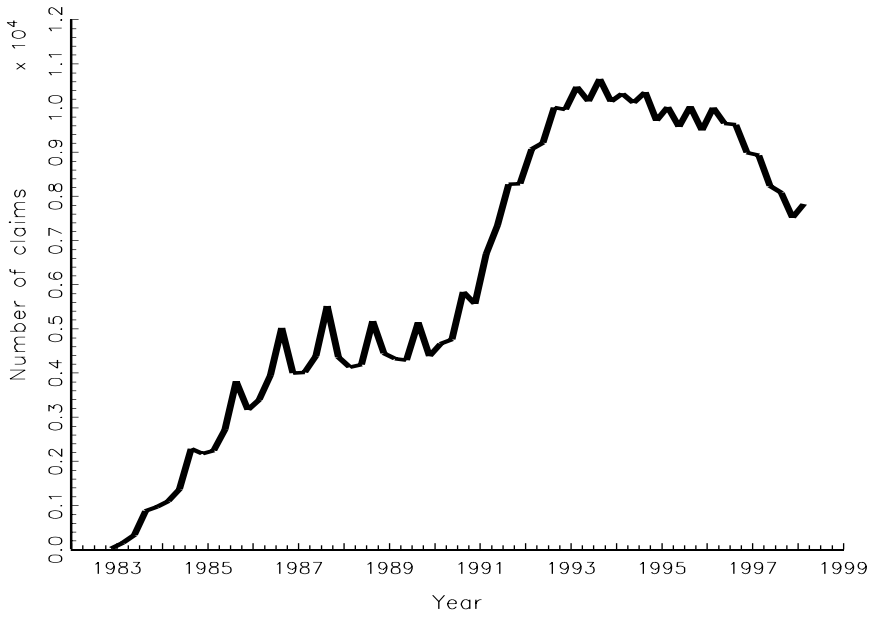


Figure 2: The average elapsed duration of unemployment over time.

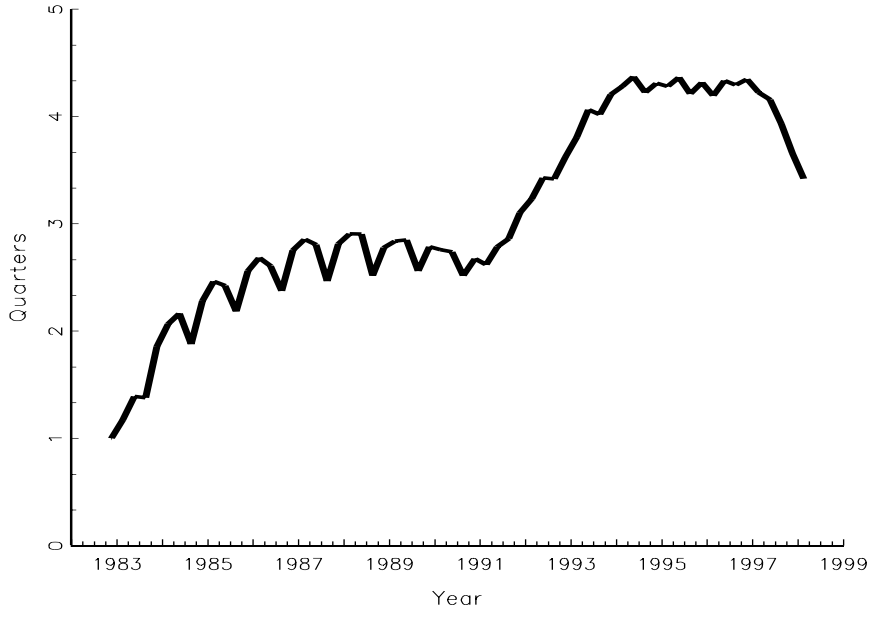


Figure 3: The quarterly flow into and out of unemployment.

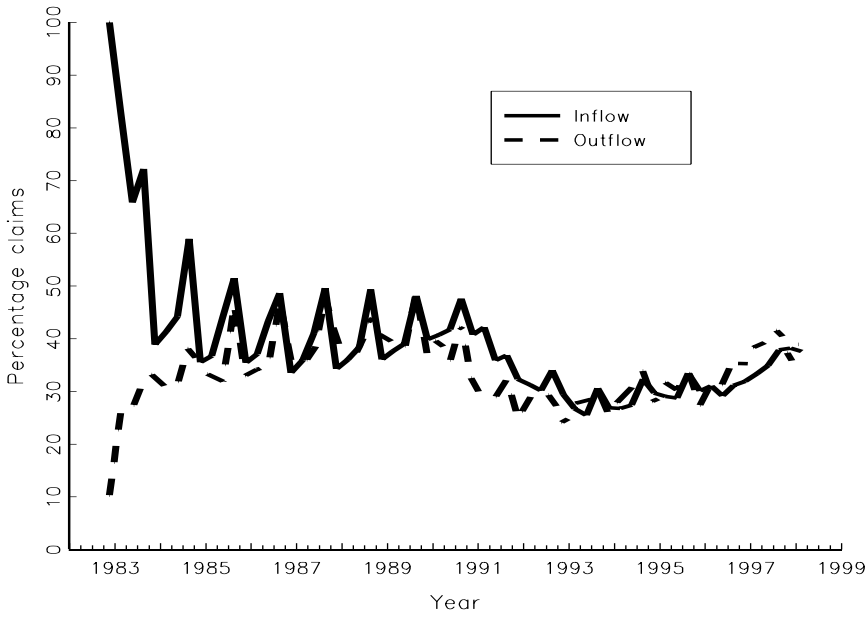


Figure 4: Kaplan-Meier estimates of the hazard rates of becoming unemployed for the first time (initial condition), leaving unemployment and leaving employment within one quarter.

Figure 5: Repeated unemployment over time and the lifecycle.

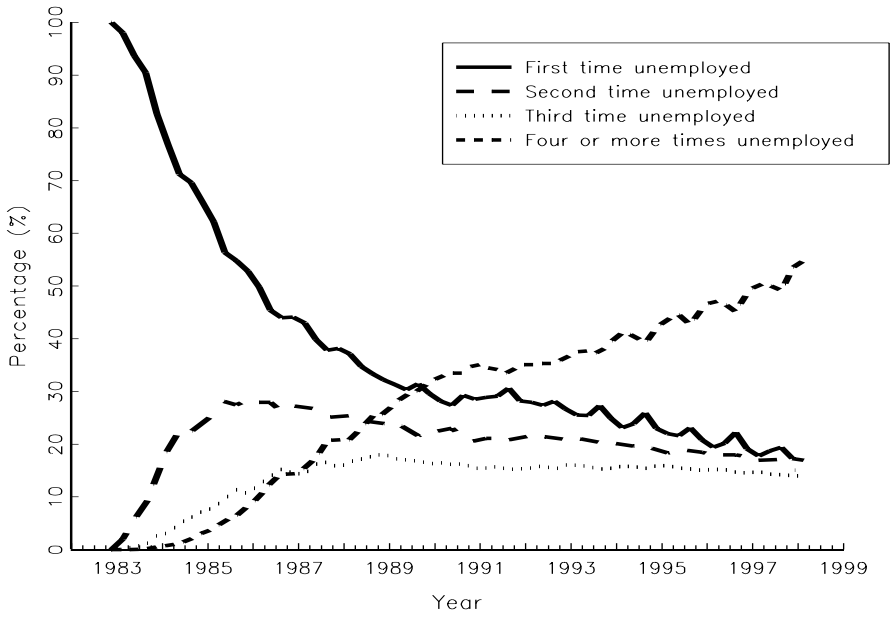
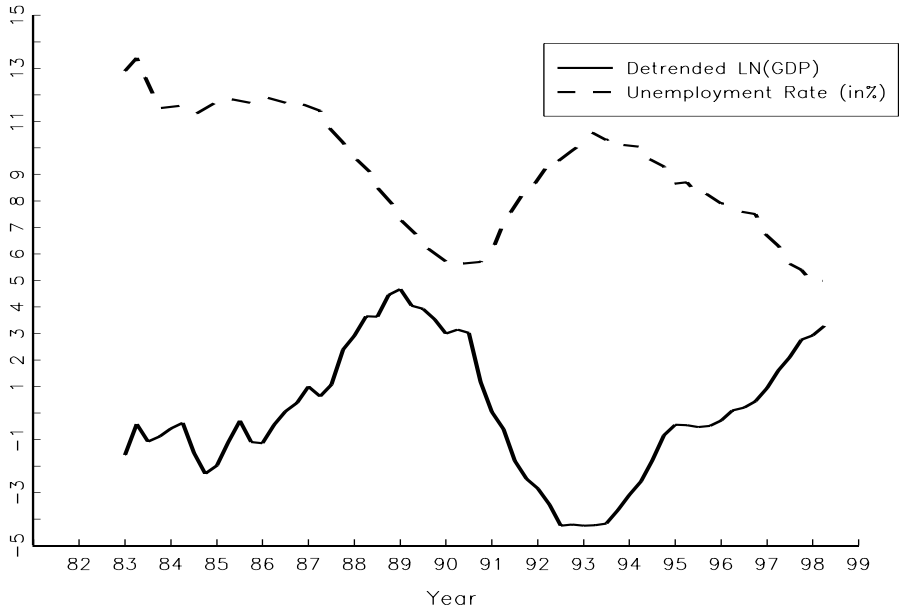


Figure 6: Macroeconomic indicators.



Source: National Statistics, www.statistics.gov.uk

Table 1: Regional distribution of unemployment in the stock sample for selected years.

Cells: share	1983	1986	1989	1992	1995	1998
South East	0.30	0.29	0.21	0.29	0.28	0.27
East Anglia	0.02	0.03	0.03	0.03	0.03	0.03
South West	0.09	0.09	0.07	0.08	0.08	0.07
West Midlands	0.09	0.09	0.10	0.09	0.09	0.09
East Midlands	0.05	0.06	0.07	0.06	0.07	0.06
Yorkshire and Humberside	0.10	0.10	0.11	0.10	0.10	0.11
North West	0.14	0.13	0.14	0.12	0.12	0.13
North	0.05	0.05	0.07	0.06	0.06	0.07
Wales	0.06	0.06	0.07	0.06	0.06	0.05
Scotland	0.10	0.11	0.12	0.10	0.10	0.11
Northern Ireland	-	-	-	-	0.00	0.01
All Regions	1.00	1.00	1.00	1.00	1.00	1.00

Table 2: The effects of the covariates on the different quarterly hazard rates in percentage differences from the baseline hazard (i.e. the probability of leaving within a quarter for the reference individual). Standard errors are in parentheses.

	Hazard of becoming unemployed for the first time	Hazard of leaving unemployment	Hazard of leaving employment
Baseline Hazard	0.18 (0.02)	0.46 (0.01)	0.36 (0.02)
Duration Dependence			
1 Quarter	100% (-)	100% (-)	100% (-)
2 Quarters	82% (1.8%)	77% (0.8%)	71% (0.7%)
4 Quarters	86% (2.1%)	59% (0.9%)	61% (0.8%)
8 Quarters	68% (2.3%)	40% (1.3%)	27% (0.6%)
16 Quarters	73% (3.4%)	29% (2.4%)	14% (0.6%)
24 Quarters	77% (5.0%)	20% (3.6%)	7% (0.6%)
Business Cycle			
High Growth (LNGDP=4)	88% (0.8%)	119% (0.8%)	89% (0.5%)
Average Growth (LNGDP=0)	100% (-)	100% (-)	100% (-)
Low Growth (LNGDP=-4)	114% (1.0%)	84% (0.5%)	112% (0.7%)
Season			
First Quarter	100% (-)	100% (-)	100% (-)
Second Quarter	114% (1.8%)	104% (1.1%)	109% (1.1%)
Third Quarter	146% (2.3%)	120% (1.2%)	109% (1.1%)
Fourth Quarter	97% (1.6%)	91% (1.0%)	102% (1.1%)
Duration of the Previous Spell of Unemployment			
No previous spell		100% (-)	
1 Quarter		115% (1.1%)	100% (-)
2 Quarters		97% (0.9%)	103% (0.4%)
4 Quarters		82% (0.9%)	106% (0.9%)
8 Quarters		69% (0.9%)	109% (1.4%)
16 Quarters		58% (0.9%)	112% (1.9%)
24 Quarters		53% (1.0%)	114% (2.2%)
Region			
South East	100% (-)	100% (-)	100% (-)
East Anglia	114% (4.1%)	108% (2.3%)	109% (2.5%)
South West	123% (3.1%)	107% (1.5%)	113% (1.7%)
West Midlands	133% (3.0%)	97% (1.2%)	108% (1.6%)
East Midlands	124% (3.2%)	101% (1.5%)	109% (1.9%)
Yorkshire and Humberside	135% (3.1%)	100% (1.2%)	120% (1.8%)
North West	135% (2.8%)	96% (1.1%)	117% (1.6%)
North	141% (3.8%)	93% (1.3%)	124% (2.1%)
Wales	146% (4.2%)	99% (1.5%)	115% (2.1%)
Scotland	133% (3.0%)	100% (1.2%)	120% (1.7%)
Northern Ireland	242% (29%)	91% (6.8%)	92% (9.1%)
Unobserved Individual Specific Heterogeneity			
Low skilled, $Pr(\nu_i=0)$ =0.12	100% (-)	100% (-)	100% (-)
Average Skilled $Pr(\nu_i=0.05)=0.51$	66% (0.8%)	106% (1.2%)	65% (0.8%)
High skilled, $Pr(\nu_i=0.13)=0.37$	36% (0.5%)	114% (1.5%)	35% (0.5%)

Figure 7: Genuine duration dependence.

Figure 8: Business cycle effects.

Table 3: Lifecycle unemployment. The baseline simulation is for an individual who will be unemployed at least once, is living in 'East Midlands', has average skills and economic growth is at its trend value from the age of 18 up to 35 years. Standard errors are in parentheses.

Baseline	Total Time in Unemployment (in Quarters)	Number of Unemployment Spells	Fraction in Unemployment	Elapsed Duration in Unemployment	Fraction in Stable Employment
At age 20	1.85 (0.17)	0.92 (0.08)	0.25 (0.02)	3.18 (0.07)	0.00 (-)
At age 25	6.66 (0.65)	2.71 (0.24)	0.21 (0.03)	4.63 (0.17)	0.42 (0.03)
At age 30	10.4 (1.19)	3.94 (0.41)	0.17 (0.03)	6.03 (0.27)	0.61 (0.04)
At age 35	13.1 (1.68)	4.85 (0.57)	0.12 (0.02)	5.84 (0.37)	0.69 (0.05)
Alternative Scenarios: point-wise differences from the Baseline					
Region 'South East'					
At age 20	-0.29 (0.05)	-0.15 (0.02)	-0.03 (0.01)	-0.01 (0.04)	0.00 (-)
At age 25	-0.68 (0.15)	-0.33 (0.05)	-0.01 (0.01)	0.07 (0.17)	-0.01 (0.01)
At age 30	-0.91 (0.29)	-0.43 (0.09)	-0.01 (0.01)	0.27 (0.29)	0.02 (0.01)
At age 35	-1.15 (0.42)	-0.55 (0.13)	-0.01 (0.01)	0.41 (0.41)	0.03 (0.01)
Region 'North'					
At age 20	0.33 (0.05)	0.10 (0.02)	0.05 (0.01)	0.18 (0.07)	0.00 (-)
At age 25	1.40 (0.21)	0.28 (0.06)	0.06 (0.01)	0.65 (0.21)	-0.05 (0.01)
At age 30	2.66 (0.41)	0.50 (0.10)	0.05 (0.01)	0.50 (0.31)	-0.09 (0.02)
At age 35	3.98 (0.68)	0.75 (0.15)	0.06 (0.02)	1.42 (0.52)	-0.10 (0.02)
Low Skilled					
At age 20	0.84 (0.14)	0.39 (0.07)	0.13 (0.02)	0.06 (0.03)	0.00 (-)
At age 25	3.44 (0.48)	1.21 (0.22)	0.15 (0.02)	0.11 (0.10)	-0.15 (0.02)
At age 30	6.38 (0.87)	2.10 (0.36)	0.14 (0.02)	-0.26 (0.30)	-0.24 (0.03)
At age 35	9.59 (1.25)	3.03 (0.51)	0.17 (0.02)	0.35 (0.38)	-0.26 (0.04)
High Skilled					
At age 20	-0.87 (0.07)	-0.39 (0.04)	-0.11 (0.01)	-0.25 (0.06)	0.00 (-)
At age 25	-3.36 (0.22)	-1.23 (0.10)	-0.12 (0.01)	-0.78 (0.23)	0.07 (0.05)
At age 30	-5.46 (0.39)	-1.83 (0.13)	-0.10 (0.02)	-0.85 (0.41)	0.15 (0.05)
At age 35	-7.19 (0.65)	-2.39 (0.21)	-0.08 (0.01)	-0.82 (0.65)	0.18 (0.03)
A Macroeconomic change between the ages of 20 and 25. After the age of 25: Average Growth					
Low Growth					
At age 20	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (-)
At age 25	1.48 (0.13)	0.10 (0.02)	0.09 (0.009)	1.27 (0.11)	-0.07 (0.01)
At age 30	2.09 (0.18)	0.17 (0.02)	0.01 (0.003)	0.57 (0.23)	-0.04 (0.01)
At age 35	2.38 (0.22)	0.22 (0.02)	0.01 (0.004)	0.47 (0.31)	-0.02 (0.01)
High Growth					
At age 20	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (-)
At age 25	-1.28 (0.09)	-0.15 (0.02)	-0.08 (0.007)	-1.27 (0.14)	0.08 (0.01)
At age 30	-1.89 (0.17)	-0.23 (0.03)	-0.02 (0.004)	-0.72 (0.29)	0.04 (0.01)
At age 35	-2.11 (0.22)	-0.28 (0.03)	-0.01 (0.003)	-0.29 (0.34)	0.02 (0.01)

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