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INDIVIDUALS' UNEMPLOYMENT DURATIONS OVER THE BUSINESS CYCLE

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ABSTRACT

Using a large panel of administrative records on unemployment durations this study confirms the predictions of the ranking model of Blanchard and Diamond (1994) that an individual's probability of leaving unemployment decreases with unemployment duration and increases with labour market tightness. I find no strong empirical evidence to support the further prediction of the ranking model that genuine negative duration dependence is stronger the more depressed the labour market. Moreover I show that the findings in some previous studies in line with this latter prediction of the ranking model may arise from failing to control for cyclical fluctuations in the composition of the newly unemployed. In line with the matching model of Lockwood (1991) I find that genuine negative duration dependence is slightly stronger the tighter the labour market for unemployment durations up to four years.

Keywords: Unemployment, Duration model, Business Cycles

JEL-codes: J64, C41, E32

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1 INTRODUCTION

An individual's probability of leaving unemployment is widely observed to decrease with the elapsed duration in unemployment, i.e. the presence of negative duration dependence in the probability of leaving unemployment. This implies that the long-term unemployed are the more disadvantaged unemployed. For this reason welfare programs designed to get the unemployed back into work often target the long-term unemployed in particular by providing wage subsidies, training or job search assistance. Examples are the Restart (Dolton and O'Neill, 1996) and the New Deal programs (Bell et al. 1999) in the United Kingdom, and the Targeted Jobs Tax Credit (Katz, 1996) and Welfare to Work programs (Leonard, 1999) in the United States. When evaluating a welfare program designed to get the (long-term) unemployed into work it is of importance to understand the extent to which an individual's probability of leaving unemployment is affected by the business cycle and elapsed duration in unemployment, i.e. the pattern of genuine duration dependence, and the extent to which this pattern of genuine duration dependence varies over the business cycle. Interest in these issues also emerges in the literature on aggregate unemployment dynamics that is concerned with the source of cyclical fluctuations in the average durations of unemployment (Darby et al., 1985, and Baker, 1992, Abbring et al., 2001, Turon, 2003).

The main objective of this study is to examine in detail the cyclical sensitivity of genuine duration dependence in the probability of leaving unemployment. As is well known, the commonly observed negative duration dependence can be explained by both sorting and genuine negative duration dependence (Lancaster, 1979, Layard et al, 1991, Van den Berg and Van Ours, 1994). Sorting refers to a dynamic selection mechanism based on a relationship between individual heterogeneity and job performance, i.e. those perceived to be most productive are hired first (Salant, 1977). An often cited economic model explaining genuine negative duration dependence is the ranking model of Blanchard and Diamond (1994), in which an employer ranks applicants by their unemployment durations and hires the one with the shortest duration. This ranking model also predicts a decrease in the probability of leaving unemployment when the labour market becomes more depressed and, moreover, that genuine negative duration dependence is stronger the more depressed the labour market. The latter result comes from the fact that the tighter the labour market, i.e. the lower the unemployment rate, the lower the ratio of applications to vacancies, and, consequently, the more likely the unemployed is the sole applicant; hiring then occurs whether or not the unemployed is long-term unemployed. An alternative to the ranking model of Blanchard and Diamond (1994) is the matching model of Lockwood (1991) who considers firms imperfectly testing workers before hiring them. In this model unemployment duration is a signal of productivity and, consequently, Lockwood's model predicts that in equilibrium, if it is profitable for a firm to

test, it is also profitable for firms to base their hiring decision on unemployment duration. Due to this discriminative behaviour of firms, genuine negative duration dependence is stronger the tighter the labour market. This latter result comes from the fact that a long spell of unemployment is in times of high unemployment less of a bad signal to a firm than in times of low unemployment. Hence, the models of Lockwood (1991) and Blanchard and Diamond (1994) reach opposite conclusions concerning the pattern of genuine duration dependence over the business cycle.

Empirical evidence points to pro-cyclical sensitivity of the probability of leaving unemployment (Sider, 1985, Butler and McDonald, 1986, Dynarski and Sheffrin, 1990, Layard et al., 1990, Baker, 1992). Empirical evidence on the cyclical sensitivity of genuine duration dependence is scarce and inconclusive, mainly due to data limitations. Using individual-level data from the US, Dynarski and Sheffrin (1990) conclude that the increase in the hazard of leaving unemployment when the unemployment rate decreases is stronger the longer the duration in unemployment. This conclusion is in support of the ranking model of Blanchard and Diamond (1994). In support of Lockwood's (1991) model, Imbens and Lynch (1993), also using US data, find a positive interaction effect from the duration of non-employment with the national unemployment rate. Using aggregated data from the US, Sider (1985) concludes that the probabilities of leaving unemployment are more cyclically sensitive the shorter the duration in unemployment, while Butler and McDonald (1986) conclude that the probabilities of leaving unemployment are more cyclically sensitive the longer the duration and Abbring et al. (2001) that in an economic boom duration dependence becomes stronger at low durations and less strong at higher durations. Turon (2003), using aggregated UK data, finds no significant cyclical variation in duration dependence.[1]

This study is organized as follows. Section 2 describes the data. The data used are administrative data from the United Kingdom on individuals' unemployment related benefit claims covering 361,723 claims of 111,506 men from the fourth quarter in 1982 up to the first quarter in 1998. These individual-level data are unique in the sense that the number of observations is large in both the time and cross-section dimensions and, moreover, consist of multiple observations per individual if the individual became unemployed more than once during the observation period. These data make it possible to significantly contribute to the existing literature by allowing us to disentangle the effects on the probability of leaving unemployment of the business cycle, genuine duration dependence, genuine duration dependence interacted with the business cycle, and individual heterogeneity. A quarterly series of the national unemployment rate is used to control for business cycle effects. Section 3 formulates the econometric model, a multi-spell duration

[1] Other references are: Rosholm (2001), using Danish data, Abbring et al. (2002), using French data, and Cockx and Dejemeppe (2001), using Belgium data.

model (Lancaster, 1990), and discusses the estimation and identification (Van den Berg, 2001). Section 4 reports and discusses the estimation results. Section 5 summarizes and concludes.

2 THE DATA: JOINT UNEMPLOYMENT AND VACANCY OPERATING SYSTEM (JUVOS)

The data used in this study are taken from the JUVOS, which is a longitudinal database of a five percent sample of all claims for unemployment related benefits paid through the National Unemployment Benefits System since 1982. Sampling is based on a claimant's National Insurance Number and yields a random and representative sample of the unemployed population.2 Using these data defines unemployment for this study as claiming unemployment related benefits. In the UK, individuals who become unemployed are entitled to benefits up to twelve months if they have paid enough National Insurance Contributions. The period of entitlement has been reduced to a maximum of six months in October 1996. These insurance-based benefits are not means tested. Individuals 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 means tested criteria is met, has an indefinite duration.

The data available for this study are one-fifth of the JUVOS data, i.e. a one percent random sample of all claims for unemployment related benefits in the UK, between the 1st of October 1982 and the 31st of December 1999. This sample includes claims that started before but ended after the 1st of October 1982 and claims that started before but end after the 31st of December 1999. A claim of an individual is included in the sample if the individual has a National Insurance number that ends in a specific pair of digits. This sampling scheme based on the National Insurance number makes it possible to follow individuals over the whole sample period, hence creating multiple spell observations for individuals entering unemployment more than once. JUVOS records consist of the start and end date of the claim. Furthermore, information is gathered on individuals' gender, date of birth and marital status, 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. Information on marital status allows for the distinction between single (including widowed and divorced) and married (including cohabitating).

The main advantages of using the JUVOS are that the definition of unemployment remains the same over the sample period and that many individuals are observed over a very long time period.

2 The JUVOS is updated on a daily basis using information supplied by the Employment Service local offices. This system is maintained by National Statistics. Each month, National Statistics publish the so-called Claimant Count statistics from the JUVOS.

The main disadvantages are that the data have little information on the individuals' characteristics, for instance the level of education is unknown, and that it is not observed what the main activity will become when leaving unemployment.3 Although this may limit the issues one wishes to examine, I like to emphasise that a considerable length of the sample period and multi-spell duration data are necessary to examine the pattern of genuine duration dependence over the business cycle thoroughly and I therefore use the JUVOS.

The sample used in this study is restricted to men aged 18-59 years who experienced unemployed at least one time between the 1st of October 1982 and the 31st of March 1998.4 In total 116,510 men over the period 1982.IV-1998.I make up for 384,016 spells of unemployment. This is about a 1% representative stock sample of the population unemployed men aged 18-59 years. The stock sample is used for descriptive statistics only and the empirical analysis is carried out on the flow sample in order to obtain consistent estimates of the parameters of the distribution of unemployment durations (Lancaster, 1990). The flow sample includes all spells of unemployment that started in or after 1982.IV and after the individual turned 18 years of age. For individuals living in Northern Ireland unemployment spells are removed that started before 1994.I. This amounts to an exclusion of 22,293 spells of unemployment (5.8%). The flow sample consists of 111,506 men over the period 1982IV-1998I who made up for 361,723 spells of unemployment. Only 2.7% of these are right-censored.

Figure 1 reports on the number of unemployed men in the UK over the period 1982.IV-1998.I in both the stock and flow sample. The stock sample shows that while unemployment remains fairly stable in the first half of the 1980's, in the second half of the 1980's unemployment declined up to 1990, unemployment rose again during the recession years of the early 1990's, and after 1993 there has been a steady decline in unemployment up to 1998. Over time the proportion of the stock of unemployed included in the flow sample is rising rapidly. The flow sample includes virtually all unemployed of the stock sample after a couple of years. Figure 2 reports on the average elapsed duration in both samples and the differences are quite striking, underlining the importance of using a flow sample for the econometric analysis. Although only a very small percentage has been deleted from the stock sample to create the flow sample Figure 2 shows that the observations excluded are the long-term unemployed who have a disproportionately large weight in the average duration

3 From August 1996 onwards a question is asked on the destination state and from January 1995 onwards a question on the sought occupation is asked. Using this information clearly limits the sample to an extent that the cyclical variation in duration dependence can no longer be examined.

4 Many unemployed women have a partner who is an earner. After exhausting benefits these women are unlikely to be entitled to Income Based Job Seekers Allowance and therefore leave the JUVOS without actually having found employment. For this reason only men are included in the sample used in this study. For unemployed men this issue does not seriously affect the unemployment count (Nickell, 1999). After April 1998 the New Deal program has been implemented which affects the registration of claims for a non-random group of unemployed. Hence, the data is censored at this point in time.

in the stock sample. The pattern of elapsed duration over the business cycle is in line with descriptive statistics in Layard et al. (1991, Chap. 5). Low levels of unemployment are characterized by decreasing elapsed durations in the late 1980's. Throughout the 1990's unemployment decreased while elapsed duration increased. Figure 3 reports on the aggregate flows into and from unemployment. Both the inflow and outflow are observed to be pro-cyclical. The difference between the inflow and outflow determines the change in aggregate unemployment. Figure 4 reports on the hazard rate of leaving unemployment and the Survival function at a given duration. Figure 4 shows the, in the UK, commonly observed decrease in the hazard of leaving unemployment with elapsed duration. The increase in the hazard from the 4th to the 5th quarter is likely to be the result of the transition from unemployment benefits to Income Based Job Seekers Allowance, which is means-tested. The Survival function shows that over 90% of the unemployed men leave unemployment within 2 years, 1% is still unemployed after 5 years and 0.2% is still unemployed after 8 years. Table 1 reports the frequency distribution of the number of spells of unemployment observed per individual in the flow sample. About 65% of the individuals in the sample experience more than one spell of unemployment during the observation period. Table 2 reports on the distribution of unemployment across the regions. Apart from a negative employment shock in the early nineties that in particular affected the 'South-East', the distribution is fairly constant over time.

Table 1: Frequency distribution of the number of unemployment spells per individual.

Number of Spells	1	2	3	4	5	6	7	8	9	>9
% of Individuals	35.1	19.9	13.9	9.1	6.5	4.7	3.2	2.4	1.7	4.2

Table 2: The regional distribution of unemployment in the stock sample for selected quarters.

Cells: share	1982IV	1985IV	1988IV	1991IV	1994IV	1997IV
South East	0.25	0.25	0.22	0.30	0.30	0.27
East Anglia	0.03	0.03	0.02	0.03	0.03	0.03
South West	0.07	0.07	0.06	0.08	0.07	0.07
West Midlands	0.11	0.11	0.09	0.10	0.09	0.09
East Midlands	0.06	0.06	0.07	0.06	0.06	0.06
Yorkshire and Humberside	0.09	0.10	0.10	0.09	0.09	0.10
North West	0.15	0.14	0.15	0.13	0.11	0.12
North	0.07	0.07	0.09	0.06	0.07	0.07
Wales	0.06	0.06	0.06	0.05	0.05	0.05
Scotland	0.11	0.11	0.14	0.10	0.09	0.11
Northern Ireland	-	-	-	-	0.04	0.04
All Regions	1.00	1.00	1.00	1.00	1.00	1.00

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

Figure 2: The average elapsed duration of unemployment.

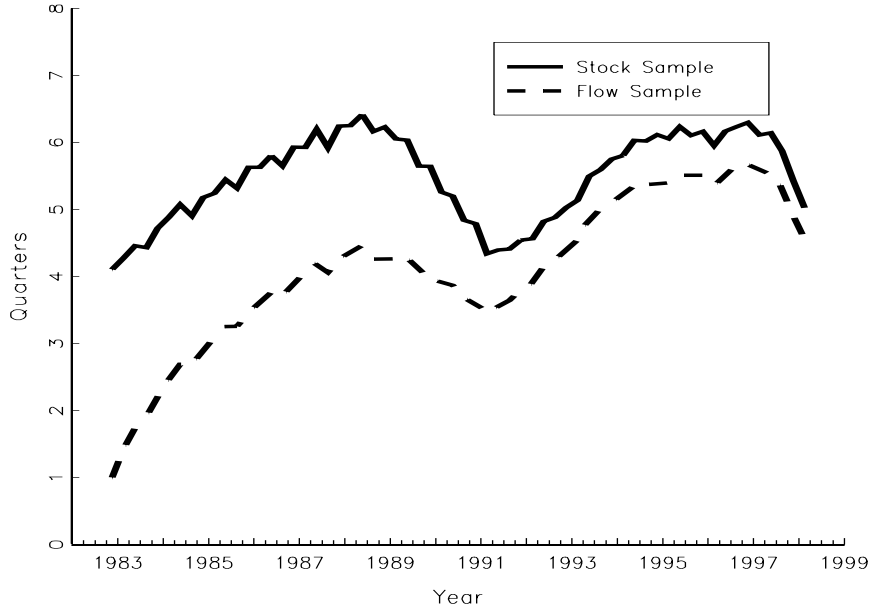


Figure 3: The quarterly flow into and out of unemployment.

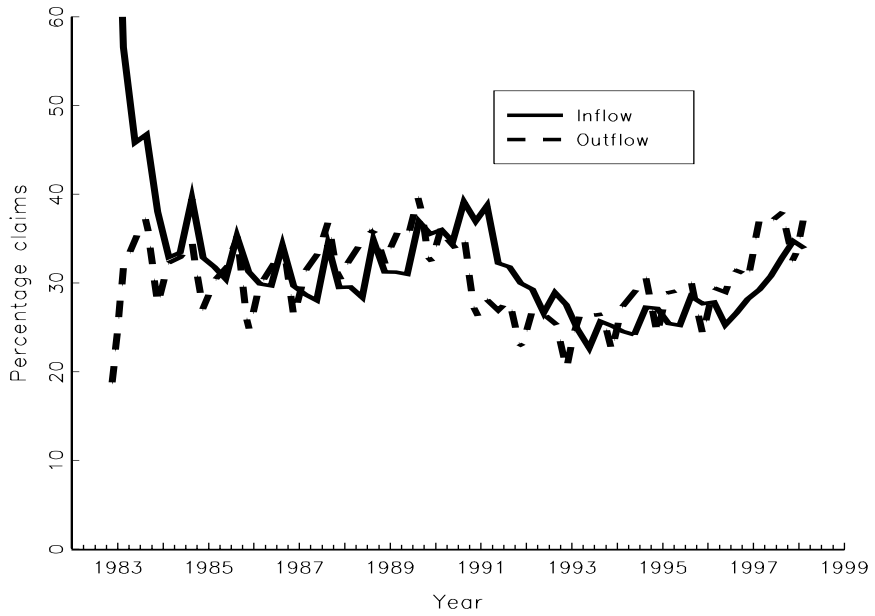
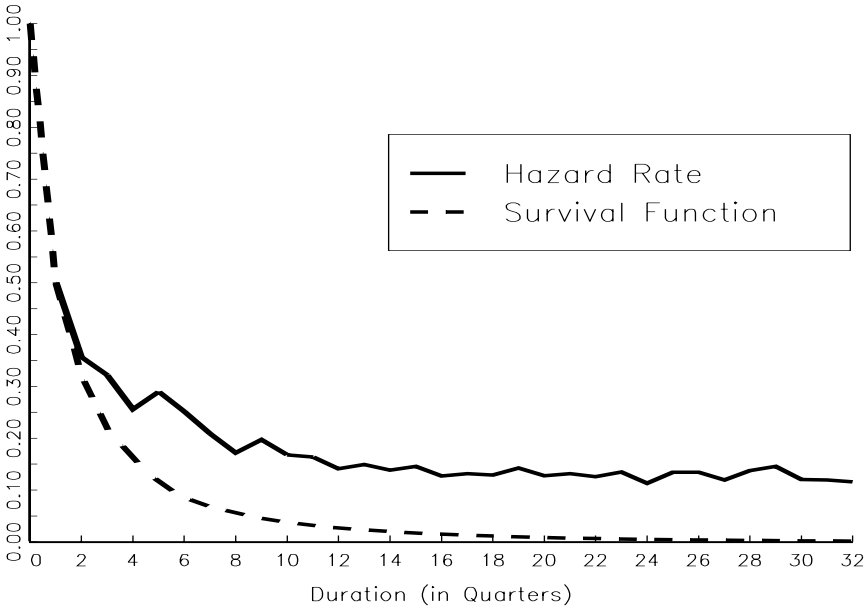


Figure 4: Kaplan-Meier estimates of the hazard of leaving unemployment within a quarter and the corresponding survival function up to 32 quarters in Unemployment.



As will be discussed in section 3, a series of the National Unemployment Rate is used as a macroeconomic indicator to control for labour market tightness. Figure 5 reports on both the national unemployment rate per quarter. Important for this study is that the time span of the sample covers more than one entire business cycle.

Figure 5: National Unemployment Rate. Source: National Statistics, **www.statistics.gov.uk**.

3 THE ECONOMETRIC MODEL

A duration model is used to model the individuals' unemployment experiences. The approach is considered to be a reduced-form approach and is taken in most empirical studies analysing 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.

The number of unemployment spells experienced by individual i is denoted by Ki, the starting date of the kth unemployment spell is denoted by τik, the duration of the kth unemployment spell by tik and cik is a dummy variable equal to 1 if the kth unemployment spell is incomplete (right-censored) and equal to 0 otherwise. N denotes the number of individuals in the sample. Xik 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 v_i and is assumed to be constant across spells. The hazard rate of a transition from unemployment into employment, i.e. the transition intensity of leaving unemployment, is denoted by $h(t_{ik} \mid \tau_{ik}, X_{ik}, \upsilon_i; \beta)$, where β is a parameter vector. The density function of the duration of unemployment is given by (Lancaster, 1990):

$$g(t_{ik} \mid \tau_{ik}, X_{ik}, v_i; \beta) = h(t_{ik} \mid \tau_{ik}, X_{ik}, v_i; \beta) \exp\left\{-\int_0^{t_{ik}} h(s \mid \tau_{ik}, X_{ik}, v_i; \beta) ds\right\}. \quad (1)$$

The survival function is given by:

$$1 - G(t_{ik} \mid \tau_{ik}, X_{ik}, v_i; \beta) = \exp\left\{-\int_0^{t_{ik}} h(s \mid \tau_{ik}, X_{ik}, v_i; \beta) ds\right\}. \quad (2)$$

The likelihood contribution for a right-censored spell is the survival function. For each individual the set of observations is denoted by $H_i = \{\tau_{ik}, t_{ik}, c_{ik}, X_{ik}\}_{k=1,..,K_i}$. A support point approach as described in Heckman and Singer (1984) is used to model the distribution of the unobserved individual specific characteristic v_i. I refer to Huh and Sickles (1994) for a discussion on the empirical implementation of this method and the comparison with alternative parametric approaches. The number of mass points is denoted by P, a mass point is denoted by v_p, and the corresponding probability mass is given by $\Pr(v_i = v_p) = \pi_p$. Using the mass point distribution and

the ingredients described above the likelihood function for a sequence of unemployment spells of individual i is given by:

$$L_i\left(H_i \mid \theta\right) = \sum_{p=1}^{P}\left(\prod_{k=1}^{K_i}\left[g(t_{ik} \mid \tau_{ik}, X_{ik}, \nu_p; \beta)\right]^{1-c_{ik}}\left[1-G(t_{ik} \mid \tau_{ik}, X_{ik}, \nu_p; \beta)\right]^{c_{ik}}\right)\pi_p \quad . \qquad (3)$$

Where $\theta = \left(\beta, \nu_1, .., \upsilon_P, \pi_1, .., \pi_P\right)$. The Maximum Likelihood estimates are given by:

$$\hat{\theta} = \arg\max_{\theta} \sum_{i=1,..,N} \ln\left(L_i\left(H_i \mid \theta\right)\right) \quad . \qquad (4)$$

As discussed in Section 2 (Table 1), the data I use to estimate this model are multiple unemployment spells for many individuals and this panel aspect of the data is of crucial importance for identification. Honoré (1993) shows that identification of a multi-spell mixed proportional hazard model is achieved under considerable weaker assumptions than a single-spell mixed proportional hazard model.5 Van den Berg (2001) provides an excellent overview of identification issues when using multi-spell duration data. Important for this study is that having multi-spell data does not require proportionality between the observed explanatory variables and duration dependence (see Section 3.1). The identification of the model does, however, require proportionality between the unobserved heterogeneity term and the duration effect in the individual hazard rate.

3.1 THE EMPIRICAL SPECIFICATION OF THE HAZARD RATE OF LEAVING UNEMPLOYMENT

As discussed in Section 2, the observed exogenous covariates available are the region in which the claim is made and the marital status of the individual. Hence X_{ik} contains a set of region specific dummy variables and a dummy variable equal to 1 if the individual is single and 0 otherwise. As discussed above, the distribution of the unobserved individual specific characteristics is estimated using a support point approach. Genuine duration dependence is parameterised using quarter specific dummy variables, i.e. a semi-parametric specification is chosen to have maximum flexibility in the pattern of duration dependence. The last duration interval is chosen to be equal to the 31st quarter and the 32nd quarter includes all elapsed durations over 31 quarters. As discussed in section 2, only 0.2% of the unemployed have durations exceeding 31 quarters. Following Dynarski and Sheffrin (1990) and Imbens and Lynch (1993) business cycle effects are taken into account by using the national unemployment rate (*UR*) as a time varying covariate (Figure 5).[6]

5 See Elbers and Ridder (1982) for the identification of a single-spell mixed proportional hazard model.

6 See Imbens (1994) for a discussion on the identification of duration and calendar time effects.

The business cycle is allowed to affect the probability of leaving unemployment differently at different durations. This makes it possible to examine whether or not the pattern of genuine (negative) duration dependence in the probability of leaving unemployment changes over the business cycle, as found in previous studies. In addition, this makes it possible to distinguish between the theoretical models of Lockwood (1991) and Blanchard and Diamond (1994). Furthermore, one may expect the composition of the newly unemployed to change over the business cycle (Darby et al., 1985). This is modelled by allowing the intercept to vary with the state of the business cycle at the time of entering unemployment. The empirical hazard rate function of leaving unemployment is formalized as follows:

$$\ln\left(h\left(s \mid \tau_{ik}, X_{ik}, \upsilon_i; \beta\right)\right) = \beta_0 + \sum_{d=2}^{32} \beta_{1d} I(s=d) + \beta_2 \ln(UR_{\tau_{ik}+s})$$

$$+ \sum_{d=2}^{32} \beta_{2d} \ln(UR_{\tau_{ik}+s}) \times I(s=d) + X_{ik}\beta_3 + \beta_4 \ln(UR_{\tau_{ik}}) + \nu_i \quad (5)$$

The β_{1d}'s determine the pattern of genuine duration dependence in the baseline situation. β_2 denotes the effect of the business cycle on the hazard of leaving unemployment, the β_{2d}'s determine the change in the pattern of genuine duration dependence over the business cycle and β_3 is a vector containing the effects of the regional dummy variables and marital status. β_4 is the effect of cyclical fluctuations in the composition of the newly unemployed on the hazard of leaving unemployment. In addition, seasonal effects in the composition of the newly unemployed and the hazard of leaving unemployment are modelled by including dummy variables for each quarter of entry in and exit from unemployment.

4 EMPIRICAL RESULTS

The estimation results of the model outlined in section 3 are reported in Appendix A. To facilitate the discussion the estimation results are summarized in Tables 3 and 4, and Figure 6. Table 3 reports on the change in the reference probability with a change in elapsed duration (interacted with the state of the business cycle) or in one of the explanatory variables. The three states of the business cycle chosen are the two extremes at low and high unemployment, i.e. unemployment rate equals 5% and 10%, respectively, and the situation when unemployment rate is more or less on its trend value of 7.5% (see Figure 5).

Figure 6: The pattern of genuine duration dependence over the business cycle when controlled for individual heterogeneity and cyclical fluctuations in the composition of the newly unemployed.

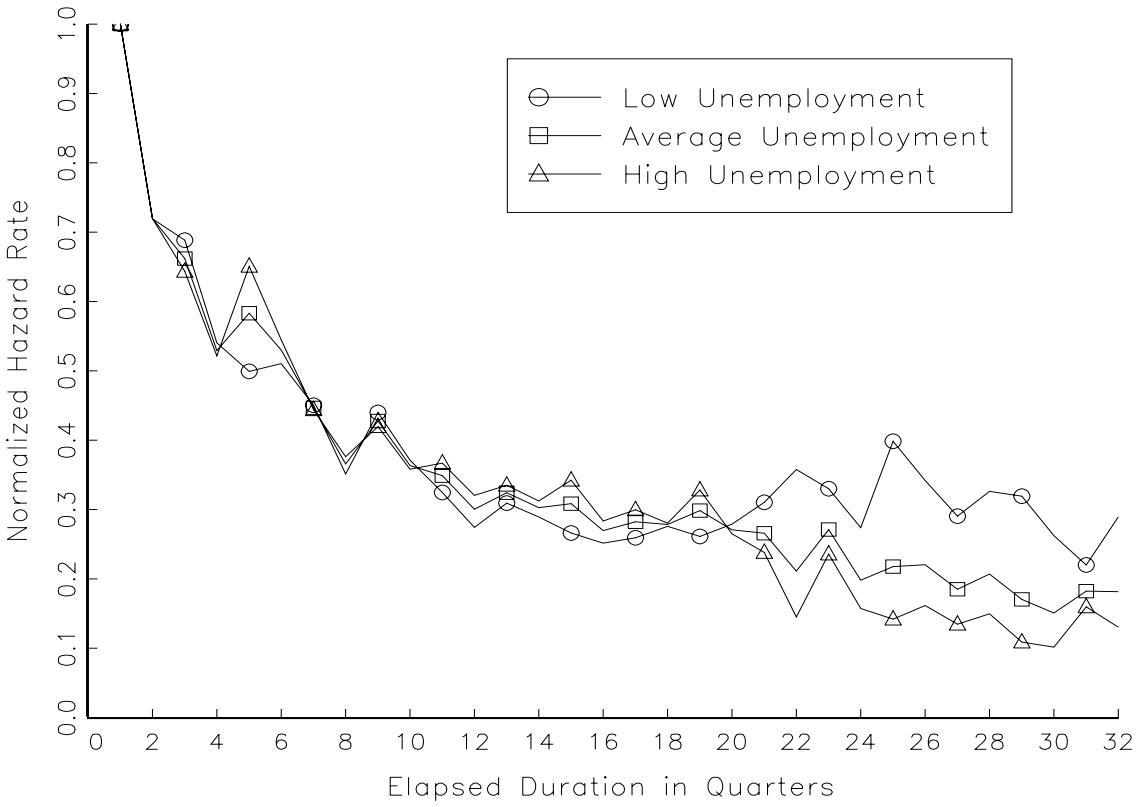


Table 3: The empirical results. Each cell contains the probability of leaving unemployment within a quarter. Standard errors are in parentheses. The reference probability is equal to 0.588 and the *'s show the corresponding characteristics.

Duration dependence over the business cycle	Unemployment Rate is 5%	Unemployment Rate is 7.5%	Unemployment Rate is 10%
Duration = 1 Quarter	0.847 (0.013)	0.588 (0.006)*	0.454 (0.005)
Duration = 2 Quarters	0.609 (0.011)	0.423 (0.005)	0.327 (0.004)
Duration = 4 Quarters	0.458 (0.011)	0.311 (0.004)	0.237 (0.004)
Duration = 8 Quarters	0.297 (0.013)	0.215 (0.005)	0.171 (0.004)
Duration = 12 Quarters	0.232 (0.015)	0.177 (0.006)	0.145 (0.006)
Duration = 16 Quarters	0.213 (0.019)	0.158 (0.007)	0.129 (0.008)
Duration = 20 Quarters	0.236 (0.026)	0.159 (0.009)	0.120 (0.013)
Duration = 24 Quarters	0.236 (0.026)	0.116 (0.011)	0.071 (0.013)
Duration = 28 Quarters	0.276 (0.039)	0.122 (0.016)	0.068 (0.017)
Duration = 32 Quarters	0.245 (0.020)	0.107 (0.006)	0.059 (0.006)
Season			
1st Quarter	0.588 (0.006)*	3rd Quarter	0.652 (0.007)
2nd Quarter	0.599 (0.006)	4th Quarter	0.499 (0.005)
Composition of the newly unemployed		Entry in 1st Quarter	0.588 (0.006)*
Unemployment Rate at Entry is 5%	0.431 (0.006)	Entry in 2nd Quarter	0.605 (0.006)
Unemployment Rate at Entry is 7.5%	0.588 (0.006)*	Entry in 3rd Quarter	0.615 (0.006)
Unemployment Rate at Entry is 10%	0.733 (0.009)	Entry in 4th Quarter	0.636 (0.006)
Region			
South East	0.588 (0.006)*		
East Anglia	0.648 (0.009)		
South West	0.628 (0.007)		
West Midlands	0.557 (0.006)		
East Midlands	0.592 (0.007)		
Yorkshire and Humberside	0.592 (0.006)		
North West	0.569 (0.006)		
North	0.577 (0.006)		
Wales	0.585 (0.007)		
Scotland	0.590 (0.006)		
Northern Ireland	0.505 (0.013)		

Age at the Start of the Spell of Unemployment	
18-24 years	0.588 (0.006)*
25-29 years	0.521 (0.005)
30-34 years	0.499 (0.005)
35-39 years	0.486 (0.005)
40-44 years	0.482 (0.005)
45-49 years	0.481 (0.005)
50-54 years	0.466 (0.005)
55-59 years	0.471 (0.006)
Marital Status	
Single	0.546 (0.005)
Not Single (married/cohabiting)	0.588 (0.006)*
Unobserved heterogeneity	
Low Skilled (ν_1=0.00, Pr(ν_i=ν_1)=0.13)	0.334 (0.009)
High Skilled (ν_2=0.57, Pr(ν_i=ν_2)=0.87)	0.588 (0.006)*

4.1 ESTIMATION RESULTS

Genuine duration dependence over the business cycle

Table 3 (top) shows that the probability of leaving unemployment increases when the labour market tightens. The baseline probability of leaving unemployment (first row) when the unemployment rate is high is 46% lower than when the unemployment rate is low (0.454 versus 0.847). This is in line with the results in Dynarski and Sheffrin (1990) and with the observed counter cyclical behaviour of the aggregate average durations of unemployment (Sider, 1985, Layard et al., 1991, Baker, 1992). This result is very close to the recent estimate of Turon (2003), who uses aggregated data from the JUVOS.

Table 3 (top) shows that up to the 24th quarter the probability of leaving unemployment decreases with duration at all three states of the business cycle. To examine the extent to which the pattern of genuine negative duration dependence changes over the business cycle the normalized hazards of leaving unemployment are graphed in Figure 6 and Table 4 reports the point-wise differences, including standard errors. A likelihood ratio test rejects the null-hypothesis that the pattern of genuine duration dependence does not change over the business cycle.[7] In the first four quarters of

[7] The LR-test statistic is equal to 300.4 (the critical value is 38.9).

unemployment the pattern of genuine duration dependence does not significantly vary with labour market tightness. This result is in line with Turon (2003). At the duration of 5 quarters there is a considerable amount of heterogeneity that I cannot control for and the results suggest that, relatively to times of low unemployment, in times of high unemployment more unemployed are not entitled to Income Based Job Seekers Allowance and leave the Claimant Count (see Section 2). For durations between 6 and 20 quarters the pattern of genuine negative duration dependence is slightly less steep in times of high unemployment than in times of low unemployment. Hence, the disadvantaged position of a long-term unemployed relatively to a short-term unemployed appears to worsen slightly with tighter labour markets, in line with the matching model of Lockwood (1991). Table 4 shows, however, that these differences are mostly insignificant. The pattern of genuine duration dependence is upward sloping from the 20th quarter onwards in the situation of low unemployment and the long-term unemployed appear to be less disadvantaged the tighter the labour market, in line with the ranking model of Blanchard and Diamond (1994). However, these latter results have to be interpreted with extreme caution since they are based on relatively few observations.[8] Table 4 also indicates that these differences are mostly insignificant.

Table 4: Normalized hazard rates at three different states of the business cycle for selected durations. The

Duration (in quarters)	1	2	4	8	12	16	20	24	28	32
Unemployment	1.000	0.719	0.540	0.351	0.274	0.253	0.279	0.274	0.326	0.289
Rate is 5%	(-)	(0.010)	(0.011)	(0.015)	(0.018)	(0.022)	(0.030)	(0.035)	(0.046)	(0.024)
Unemployment	1.000	0.719	0.529	0.366	0.300	0.270	0.271	0.198	0.207	0.181
Rate is 7.5%	(-)	(0.005)	(0.005)	(0.007)	(0.009)	(0.011)	(0.015)	(0.019)	(0.028)	(0.010)
Unemployment	1.000	0.720	0.522	0.376	0.320	0.283	0.265	0.157	0.150	0.130
Rate is 10%	(-)	(0.005)	(0.006)	(0.009)	(0.012)	(0.018)	(0.028)	(0.028)	(0.037)	(0.013)
The percentage change in the Normalized Hazard when the Unemployment Rate decrease from 10% to 5%										
%	0	-0.08	3.62	-6.61	-14.4	-11.2	5.20	74.3	117.9	121.8
	(-)	(1.62)	(2.66)	(4.84)	(7.27)	(11.3)	(19.5)	(46.0)	(72.0)	(33.0)

standard errors are in parentheses.

Seasonal effects

The seasonal differences in the probability of leaving unemployment show that there is relatively low probability of leaving unemployment in the fourth quarter of a year (Table 3). This finding can be attributed to the Christmas holidays when job search and recruitment activity is low.

8 Also note that 99% of the unemployed leave unemployment before the 20th quarter.

The composition of the newly unemployed over the business cycle

Individuals who become unemployed in times of low unemployment are found to have on average a lower probability of leaving unemployment than those who become unemployed in times of high unemployment (Table 3). This finding does not support the hypothesis put forward in Darby et al. (1985) who argue that in a recession more individuals enter unemployment with longer spells of unemployment because they are more difficult to match. Abbring et al. (2001) and Turon (2003), for instance, also find no support for the hypothesis put forward in Darby et al. (1985). The difference in the probability of leaving unemployment between entrants in situations of low and high unemployment is large and significant (0.431 versus 0.733). Seasonal differences in the composition of the inflow with respect to the effect on the probability of leaving unemployment are small.

Individual heterogeneity

Table 3 shows that the marital status has a relatively small but significant effect on the probability of leaving unemployment. Married men are slightly more likely to leave unemployment than single men, which can be attributed to married men having family responsibilities and, consequently, higher incentives for getting a job. Regional differences in the probability of leaving unemployment are relatively small. In line with Layard et al. (1991) this leads to the conclusion that regional differences in unemployment rates are to a large extent due to differences in the incidence of unemployment.[9] The probability of leaving unemployment decreases with the age at the start of an unemployment spell and in particular between 18 and 30 years of age. This may be caused by a selection over time: those who are most difficult to match are most likely to return to unemployment. As discussed in section 3 a discrete mass point approach is taken to model unobserved individual specific heterogeneity. As it turns out, two support points suffice under the normalization of one of them being equal to 0. The distribution of unobserved heterogeneity is reported at the bottom of Table 3.

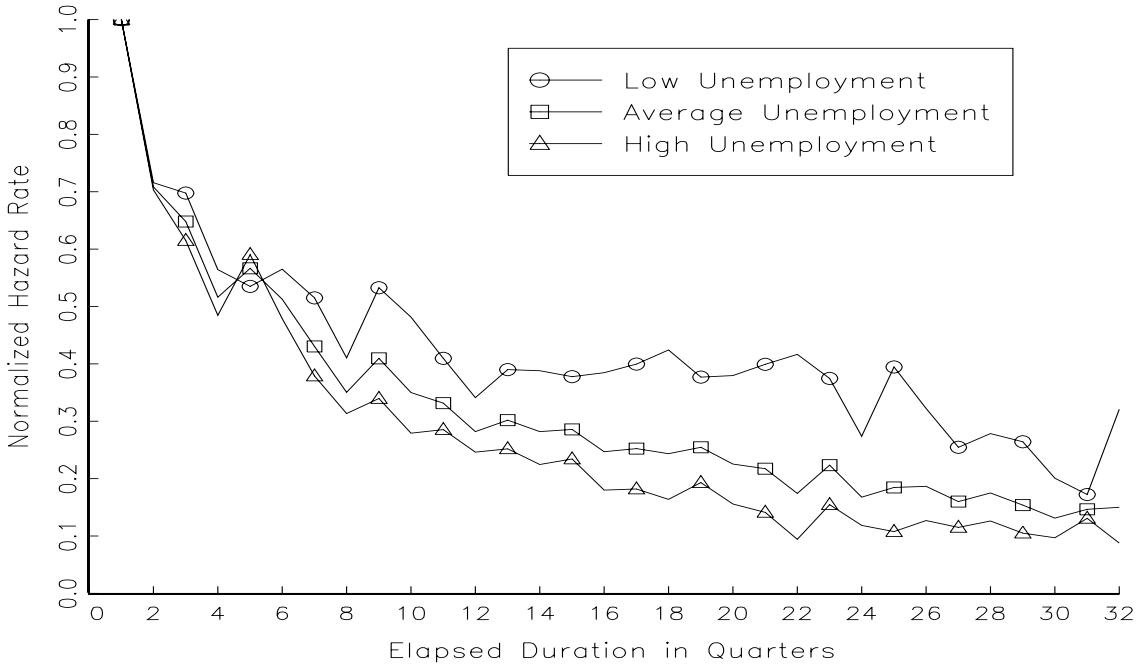
4.2 INDIVIDUAL HETEROGENEITY AND INFLOW COMPOSITION

The conclusion in Section 4.1 that emerged from Figure 6 and Table 4 is that the pattern of genuine duration dependence basically does not change in a uniform way over the business cycle and that no strong empirical evidence is found in favour of the ranking model of Blanchard and Diamond (1994) or in favour of the matching model of Lockwood (1991). This conclusion is in contrast with most of the empirical results discussed in the introduction. For this reason I re-

[9] Kalwij (2002) reports strong empirical evidence for this conclusion.

estimated the model without controlling for individual heterogeneity and cyclical fluctuations in the composition of the newly unemployed. The resulting pattern of negative duration dependence over the business cycle is shown in Figure 7. Figure 7 shows that in the data there are considerable differences in the pattern of duration dependence over the business cycle. Next, Figure 8 is based on a model in which I control for age, region, marital status and unobserved individual heterogeneity but not for cyclical fluctuations in the composition of the newly unemployed. As Figure 7, Figure 8 shows that there is also a strong difference in the pattern of genuine duration dependence over the business cycle once controlled for individual heterogeneity. Results not reported here show that these differences are highly significant at each of the durations from the third quarter onwards. Although I control in the complete model in Section 4.1 for cyclical fluctuations in the composition of the newly unemployed in a rather crude way it does wipe out most of the differences between the slopes in Figure 8 and leaves the remaining differences to be mostly insignificant, as discussed in section 4.1 and shown in Figure 6 and Table 4.[10] Dynarski and Sheffrin (1990) do not control for cyclical fluctuations in the composition of the newly unemployed, which may explain their findings that are in line with the pattern in Figure 8.

Figure 7: The pattern of genuine duration dependence over the business cycle without controlling for individual heterogeneity and cyclical fluctuations in the composition of the newly unemployed.



[10] A model that controls for cyclical fluctuations in the composition of the newly unemployment over the business cycle and not for individual heterogeneity yields a picture rather similar to Figure 6.

Figure 8: The pattern of genuine duration dependence over the business cycle when controlled for individual heterogeneity but not for cyclical fluctuations in the composition of the newly unemployed.

In other words, without controlling for cyclical fluctuations in the composition of the newly unemployed one would mistakenly conclude that there is strong empirical evidence of genuine negative duration dependence being stronger the more depressed the labour market, as predicted by the ranking model of Blanchard and Diamond (1994).

4.3 POLICY INTERVENTIONS

Over the observation period several labour market programs have been initiated to get the unemployed back into work. Examples are the Youth Training Scheme that was introduced in 1983 (Dolton et al., 1994) and the in 1987 introduced Restart programme to monitor more closely the long-term unemployed (Dolton and O'Neill, 1996). Also the period of entitlement for unemployment benefits has been reduced from a maximum of twelve months to a maximum of six months from October 1996 onwards. These policy interventions, and others not discussed here, were intended to affect individuals' unemployment experiences but it is ambitious to predict how these may have affected the pattern of genuine duration dependence over the business cycle. The data in this study do not identify participation in job search or training programs and can therefore not control for program participation. Nevertheless it is of interest to examine if the results obtained in sections 4.1 and 4.2 are robust to using a more homogenous sample with respect to the policy-environment, hence using a sample period that starts when the Restart Programme was effective and ends when the maximum duration of benefit entitlement was reduced. Thus I select

unemployment spells that started after the 1st of April 1987 and before the 30th of September 1996. This selection yields a 38% reduction in the sample and the selected sample, which remains of course a representative sample, consists of 221270 unemployment spells over 83530 men. The estimation results of the model as outlined in section 3 using this restricted sample are reported in Appendix B.

To facilitate the comparison with the previous results of sections 4.1 and 4.2 the estimation results are in similar way summarized in Tables 5 and 6, and Figures 9-11. Using the restricted sample unobserved individual specific heterogeneity is found to be absent in the data after controlling for observed characteristics and cyclical fluctuations in the composition of the newly unemployed. This lack of heterogeneity in the sample may seem somewhat surprising but is in line with previous findings of Van den Berg and Van Ours (1994) who also use UK data. A comparison of Tables 3 and 5 shows that the results concerning the effects of inflow composition, region, age and marital status remain basically unchanged, once taking into account standard errors and that the baseline probability of leaving unemployment within one quarter has decreased from 0.588 to 0.551.

Figure 9: Using the restricted sample of Section 4.3: 1987.II-1996III. The pattern of genuine duration dependence over the business cycle when controlled for individual heterogeneity and cyclical fluctuations in the composition of the newly unemployed.

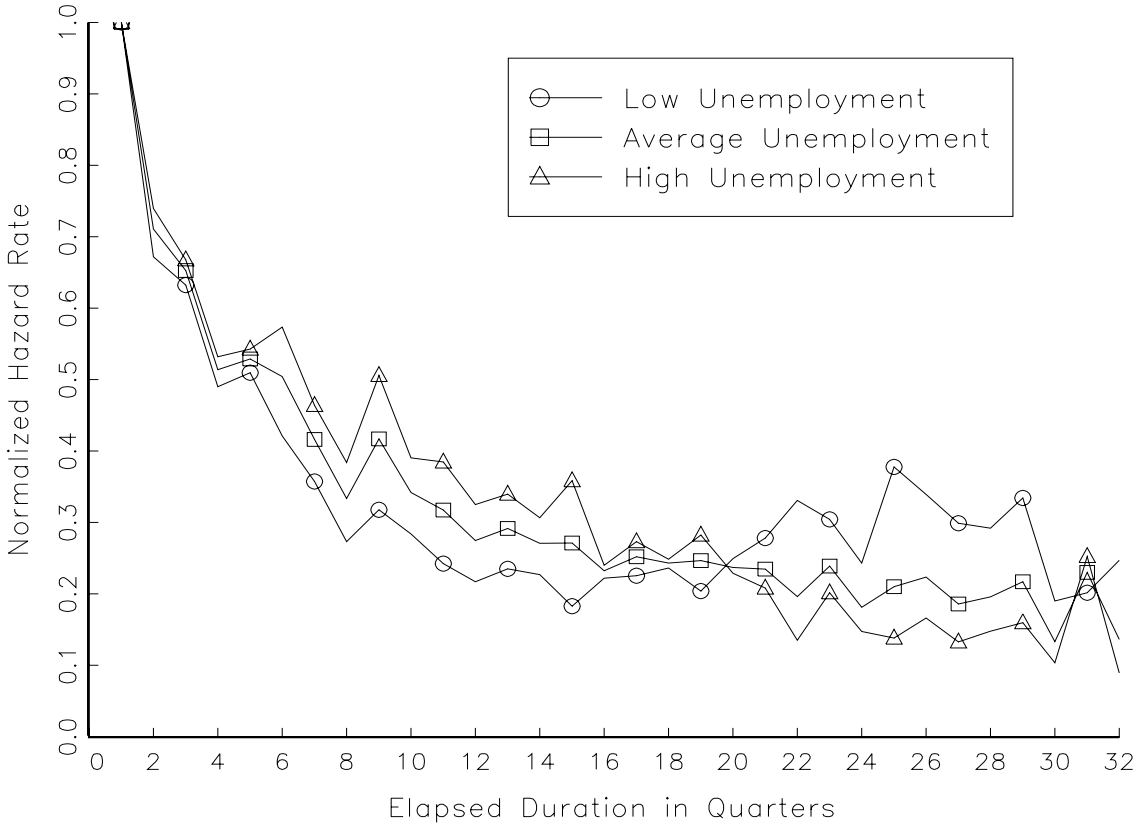


Figure 10: Using the restricted sample of Section 4.3: 1987.II-1996III. The pattern of genuine duration dependence over the business cycle without controlled for individual heterogeneity and cyclical fluctuations in the composition of the newly unemployed.

Figure 11: Using the restricted sample of Section 4.3: 1987.II-1996III. The pattern of genuine duration dependence over the business cycle when controlled for individual heterogeneity but not for cyclical fluctuations in the composition of the newly unemployed.

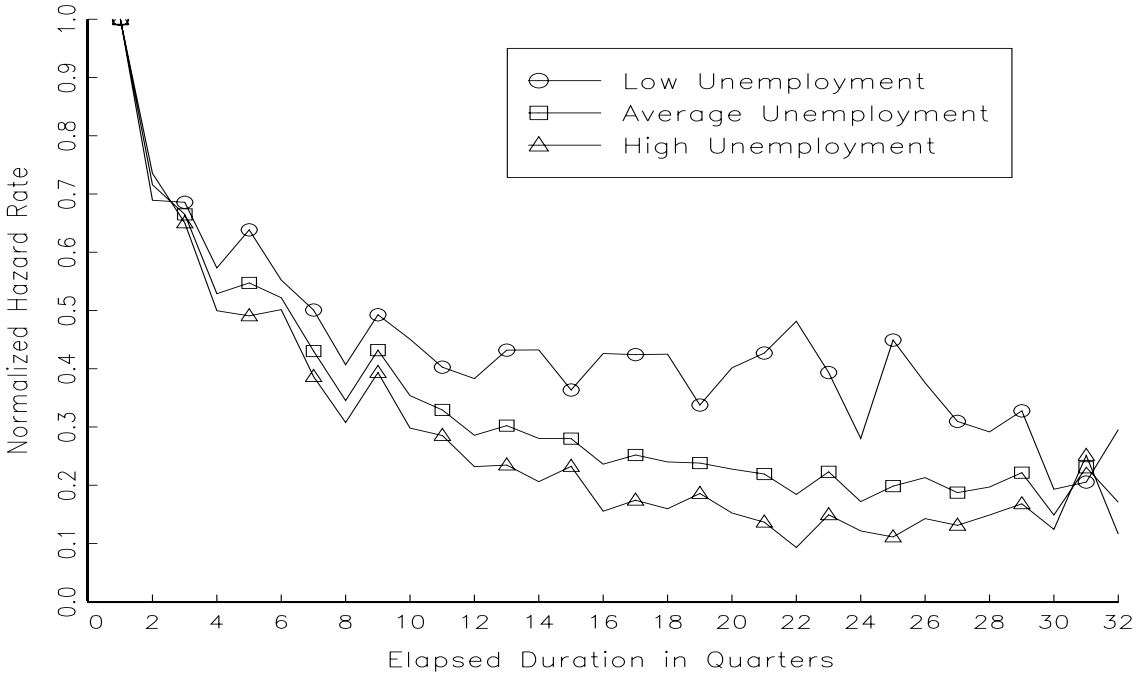


Table 5: The empirical results using the restricted sample of Section 4.2: 1987.II-1996III. The cell contains the probability of leaving unemployment within a quarter. Standard errors are in parentheses. The reference probability is equal to 0.551 and the *'s show the corresponding characteristics.

Duration dependence over the business cycle	Unemployment Rate is 5%	Unemployment Rate is 7.5%	Unemployment Rate is 10%
Duration = 1 Quarter	0.854 (0.016)	0.551 (0.006)*	0.404 (0.006)
Duration = 2 Quarters	0.574 (0.012)	0.392 (0.005)	0.299 (0.005)
Duration = 4 Quarters	0.419 (0.012)	0.283 (0.004)	0.215 (0.004)
Duration = 8 Quarters	0.233 (0.011)	0.184 (0.004)	0.155 (0.005)
Duration = 12 Quarters	0.185 (0.014)	0.152 (0.006)	0.131 (0.007)
Duration = 16 Quarters	0.190 (0.022)	0.128 (0.007)	0.097 (0.009)
Duration = 20 Quarters	0.213 (0.028)	0.131 (0.009)	0.092 (0.012)
Duration = 24 Quarters	0.208 (0.032)	0.100 (0.011)	0.059 (0.012)
Duration = 28 Quarters	0.250 (0.042)	0.108 (0.019)	0.060 (0.019)
Duration = 32 Quarters	0.211 (0.021)	0.075 (0.013)	0.036 (0.011)
Season			
1st Quarter	0.551 (0.006)*	3rd Quarter	0.599 (0.007)
2nd Quarter	0.550 (0.006)	4th Quarter	0.462 (0.006)
Composition of the newly unemployed		Entry in 1st Quarter	0.551 (0.006)*
Unemployment Rate at Entry is 5%	0.399 (0.006)	Entry in 2nd Quarter	0.569 (0.007)
Unemployment Rate at Entry is 7.5%	0.551 (0.006)*	Entry in 3rd Quarter	0.572 (0.007)
Unemployment Rate at Entry is 10%	0.693 (0.010)	Entry in 4th Quarter	0.595 (0.007)
Region			
South East	0.551 (0.006)*		
East Anglia	0.618 (0.012)		
South West	0.598 (0.009)		
West Midlands	0.544 (0.007)		
East Midlands	0.577 (0.009)		
Yorkshire and Humberside	0.575 (0.008)		
North West	0.554 (0.007)		
North	0.561 (0.008)		
Wales	0.572 (0.009)		
Scotland	0.576 (0.008)		
Northern Ireland	0.495 (0.015)		
Age at the Start of the Spell of Unemployment			

18-24 years	0.551 (0.006)*
25-29 years	0.492 (0.006)
30-34 years	0.477 (0.006)
35-39 years	0.454 (0.006)
40-44 years	0.452 (0.006)
45-49 years	0.455 (0.006)
50-54 years	0.429 (0.006)
55-59 years	0.454 (0.007)
Marital Status	
Single	0.496 (0.005)
Not Single (married/cohabiting)	0.551 (0.006)*
Unobserved heterogeneity	Not Significant

Table 6: Using the restricted sample of Section 4.3: 1987.II-1996III. Normalized hazard rates at three different states of the business cycle for selected durations. The standard errors are in parentheses.

Duration (in quarters)	1	2	4	8	12	16	20	24	28	32
Unemployment Rate is 5%	1.000	0.672	0.490	0.273	0.217	0.222	0.249	0.243	0.292	0.247
	(-)	(0.013)	(0.013)	(0.013)	(0.017)	(0.026)	(0.033)	(0.038)	(0.049)	(0.025)
Unemployment Rate is 7.5%	1.000	0.711	0.514	0.333	0.275	0.232	0.237	0.181	0.196	0.136
	(-)	(0.006)	(0.006)	(0.007)	(0.010)	(0.012)	(0.016)	(0.020)	(0.034)	(0.024)
Unemployment Rate is 10%	1.000	0.740	0.532	0.384	0.325	0.240	0.229	0.147	0.148	0.089
	(-)	(0.009)	(0.010)	(0.013)	(0.018)	(0.022)	(0.029)	(0.030)	(0.048)	(0.028)
The percentage change in the Normalized Hazard when the Unemployment Rate decrease from 10% to 5%										
%	0	-9.17	-7.86	-28.8	-37.2	-7.53	8.99	65.1	97.9	177.3
	(-)	(2.47)	(3.62)	(4.81)	(4.41)	(16.5)	(24.5)	(50.0)	(84.1)	(102.0)

Figure 9 and Table 6 investigate the difference in the pattern of genuine duration dependence over the business cycle. Figure 9 and Table 6 show that up to 16 quarters the pattern of genuine duration dependence is significantly less steep in times of high unemployment than in times of low unemployment. The decreases in the hazard of leaving unemployment when unemployment decreases from 10% to 5% range between 7% and 40%. This finding is in line with the matching model of Lockwood (1991) and suggests that a long spell of unemployment is (somewhat) less of a bad signal to a firm during a recession. From 16 quarters onwards the pattern does not significantly

vary over the business cycle. A likelihood ratio test rejects the null-hypothesis that the pattern of genuine duration dependence does not change over the business cycle.[11]

Figures 10 and 11 yield a similar conclusion as Figures 7 and 8 in section 4.2: without controlling for cyclical fluctuations in the composition of the newly unemployed one would mistakenly conclude that genuine negative duration dependence is stronger the more depressed the labour market, as predicted by the ranking model of Blanchard and Diamond (1994).

[11] The LR-test statistic is equal to 256.7 (the critical value is 38.9).

5 SUMMARY AND CONCLUSIONS

The main objective of this study is to examine the cyclical sensitivity of genuine duration dependence in the probability of leaving unemployment. The availability of multi-spell unemployment duration data covering more than one economic cycle and with a relatively large number of observations makes it possible to significantly contribute to the existing literature by allowing us to disentangle the effects on the probability of leaving unemployment of the business cycle, genuine duration dependence, genuine duration dependence interacted with the business cycle, and individual heterogeneity. A quarterly series of the national unemployment rate is used to control for business cycle effects. The most important findings can be summarized as follows:

The (baseline) probability of leaving unemployment decreases with 46% when the national unemployment rate increases from 5% to 10%. This finding is in line with previous studies and underlines the importance of controlling for business cycle effects when evaluating a policy designed to get the unemployed back into work.

Individuals who become unemployed in times of high unemployment have on average a higher probability of leaving unemployment than those who become unemployed in times of low unemployment (everything else being the same). Without controlling for these cyclical fluctuations in the composition of the newly unemployed one would mistakenly conclude that genuine negative duration dependence is stronger the more depressed the labour market (Figures 6 versus 8, and Figures 9 versus 11). This finding carries a strong warning for policy assessment: unless controlled for cyclical fluctuations in the composition of the newly unemployed an evaluation of a policy designed to get the long-term unemployed back into employment will be biased towards a success in times of low unemployment and towards a failure in times of high unemployment.

The results present no strong empirical evidence to support the prediction of the ranking model of Blanchard and Diamond (1994) that genuine negative duration dependence is stronger the more depressed the labour market. Moreover the results show that the findings in some previous studies in line with this latter prediction of the ranking model may arise from failing to control for cyclical fluctuations in the composition of the newly unemployed.

In order to control for two important policy interventions I used a sample covering a more restricted time period (Section 4.3). Using this restricted sample I find some significant empirical evidence in line with the prediction of the matching model of Lockwood (1991) that genuine negative duration dependence is slightly stronger the tighter the labour market for unemployment durations up to four years. One explanation for this is that a long spell of unemployment is less of a bad signal to a firm in a recession than in economic good times.

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APPENDIX A

Estimation results of the model outlined in Section 3. The standard errors are in parentheses. The average log-likelihood function equals –1.93103.

Covariate	p.e.	s.e.	Covariate	p.e.	s.e.
Constant	-0.8283	0.0386			
Genuine Duration Dependence (in Quarters) and Business Cycle Effects (Unemployment Rate, Fig.5)					
Duration = 1	0.00	-	ln(UR)	-0.9001	0.0256
Duration = 2	-0.3316	0.0503	(Duration = 2)xln(UR)	0.0012	0.0234
Duration = 3	-0.2154	0.0626	(Duration = 3)xln(UR)	-0.0980	0.0292
Duration = 4	-0.5326	0.0793	(Duration = 4)xln(UR)	-0.0514	0.0370
Duration = 5	-1.3094	0.0894	(Duration = 5)xln(UR)	0.3820	0.0413
Duration = 6	-0.8236	0.1131	(Duration = 6)xln(UR)	0.0938	0.0528
Duration = 7	-0.7656	0.1336	(Duration = 7)xln(UR)	-0.0201	0.0626
Duration = 8	-1.2051	0.1597	(Duration = 8)xln(UR)	0.0987	0.0747
Duration = 9	-0.7105	0.1703	(Duration = 9)xln(UR)	-0.0688	0.0801
Duration = 10	-0.9065	0.1981	(Duration = 10)xln(UR)	-0.0523	0.0934
Duration = 11	-1.4106	0.2247	(Duration = 11)xln(UR)	0.1772	0.1057
Duration = 12	-1.6553	0.2592	(Duration = 12)xln(UR)	0.2245	0.1226
Duration = 13	-1.3605	0.2732	(Duration = 13)xln(UR)	0.1161	0.1304
Duration = 14	-1.4182	0.3027	(Duration = 14)xln(UR)	0.1107	0.1452
Duration = 15	-1.9087	0.3304	(Duration = 15)xln(UR)	0.3633	0.1592
Duration = 16	-1.6557	0.3748	(Duration = 16)xln(UR)	0.1713	0.1829
Duration = 17	-1.6859	0.4087	(Duration = 17)xln(UR)	0.2088	0.2012
Duration = 18	-1.3279	0.4332	(Duration = 18)xln(UR)	0.0245	0.2157
Duration = 19	-1.8707	0.4757	(Duration = 19)xln(UR)	0.3285	0.2379
Duration = 20	-1.1592	0.5267	(Duration = 20)xln(UR)	-0.0732	0.2668
Duration = 21	-0.5548	0.5565	(Duration = 21)xln(UR)	-0.3826	0.2864
Duration = 22	1.0658	0.6358	(Duration = 22)xln(UR)	-1.3012	0.3351
Duration = 23	-0.3272	0.6217	(Duration = 23)xln(UR)	-0.4853	0.3234
Duration = 24	-0.0048	0.7189	(Duration = 24)xln(UR)	-0.8015	0.3804
Duration = 25	1.4746	0.7309	(Duration = 25)xln(UR)	-1.4882	0.3952
Duration = 26	0.6689	0.7131	(Duration = 26)xln(UR)	-1.0826	0.3839
Duration = 27	0.5516	0.8308	(Duration = 27)xln(UR)	-1.1111	0.4516
Duration = 28	0.6877	0.8742	(Duration = 28)xln(UR)	-1.1235	0.4764
Duration = 29	1.3539	1.0070	(Duration = 29)xln(UR)	-1.5508	0.5599
Duration = 30	0.8637	1.1174	(Duration = 30)xln(UR)	-1.3679	0.6160
Duration = 31	-0.7692	1.2380	(Duration = 31)xln(UR)	-0.4632	0.6510
Duration > 31	0.6083	0.4126	(Duration > 31)xln(UR)	-1.1491	0.2149

Seasonal Effects					
First Quarter	0	-	Third Quarter	0.1035	0.0062
Second Quarter	0.0195	0.0062	Fourth Quarter	-0.1645	0.0064
Regional Effects					
South East	0	-	Yorkshire and Humberside	0.0079	0.0068
East Anglia	0.0970	0.0122	North West	-0.0316	0.0064
South West	0.0660	0.0080	North	-0.0193	0.0074
West Midlands	-0.0543	0.0075	Wales	-0.0046	0.0089
East Midlands	0.0067	0.0087	Scotland	0.0053	0.0065
			Northern Ireland	-0.1510	0.0243
Age Effects					
18-24 years	0	-	40-44 years	-0.1981	0.0085
25-29 years	-0.1207	0.0065	45-49 years	-0.2005	0.0090
30-34 years	-0.1631	0.0073	50-54 years	-0.2324	0.0095
35-39 years	-0.1896	0.0080	55-59 years	-0.2222	0.0111
Effects of Marital Status			Inflow Heterogeneity		
Not Single	0	-	LN(UR)	0.7669	0.0228
Single	-0.0739	0.0048	First Quarter	0	-
Unobserved Heterogeneity			Second Quarter	0.0281	0.0068
ν_1, $Pr(\nu_i=\nu_1)=0.13$ (s.e. is 0.02)	0	-	Third Quarter	0.0448	0.0067
ν_2, $Pr(\nu_i=\nu_2)=0.87$ (s.e. is 0.02)	0.5652	0.0223	Fourth Quarter	0.0784	0.0066

APPENDIX B

Estimation results of the model outlined in Section 3, using the restricted sample of Section 4.3. The standard errors are in parentheses. The average log-likelihood function equals –1.98776.

Covariate	p.e.	s.e.	Covariate	p.e.	s.e.
Constant	-0.0208	0.0462			
Genuine Duration Dependence (in Quarters) and Business Cycle Effects (Unemployment Rate, Fig.5)					
Duration = 1	0.00	-	ln(UR)	-1.0800	0.0332
Duration = 2	-0.6212	0.0811	(Duration = 2)xln(UR)	0.1387	0.0393
Duration = 3	-0.5847	0.0958	(Duration = 3)xln(UR)	0.0785	0.0465
Duration = 4	-0.9033	0.1167	(Duration = 4)xln(UR)	0.1180	0.0568
Duration = 5	-0.8191	0.1283	(Duration = 5)xln(UR)	0.0903	0.0625
Duration = 6	-1.5820	0.1479	(Duration = 6)xln(UR)	0.4455	0.0720
Duration = 7	-1.6362	0.1692	(Duration = 7)xln(UR)	0.3769	0.0827
Duration = 8	-2.0871	0.1996	(Duration = 8)xln(UR)	0.4905	0.0975
Duration = 9	-2.2271	0.2083	(Duration = 9)xln(UR)	0.6713	0.1014
Duration = 10	-2.0005	0.2451	(Duration = 10)xln(UR)	0.4603	0.1196
Duration = 11	-2.4889	0.2883	(Duration = 11)xln(UR)	0.6658	0.1399
Duration = 12	-2.4698	0.3370	(Duration = 12)xln(UR)	0.5846	0.1639
Duration = 13	-2.3035	0.3632	(Duration = 13)xln(UR)	0.5315	0.1771
Duration = 14	-2.1795	0.4125	(Duration = 14)xln(UR)	0.4331	0.2015
Duration = 15	-3.2641	0.4704	(Duration = 15)xln(UR)	0.9722	0.2287
Duration = 16	-1.6874	0.5200	(Duration = 16)xln(UR)	0.1129	0.2567
Duration = 17	-1.9339	0.5441	(Duration = 17)xln(UR)	0.2759	0.2692
Duration = 18	-1.5590	0.5768	(Duration = 18)xln(UR)	0.0720	0.2873
Duration = 19	-2.3444	0.6302	(Duration = 19)xln(UR)	0.4690	0.3138
Duration = 20	-1.1893	0.6407	(Duration = 20)xln(UR)	-0.1243	0.3239
Duration = 21	-0.6035	0.6486	(Duration = 21)xln(UR)	-0.4200	0.3322
Duration = 22	0.9736	0.7412	(Duration = 22)xln(UR)	-1.2920	0.3896
Duration = 23	-0.2321	0.7149	(Duration = 23)xln(UR)	-0.5951	0.3685
Duration = 24	-0.2505	0.8328	(Duration = 24)xln(UR)	-0.7235	0.4366
Duration = 25	1.3608	0.8635	(Duration = 25)xln(UR)	-1.4503	0.4656
Duration = 26	0.5731	0.8304	(Duration = 26)xln(UR)	-1.0279	0.4465
Duration = 27	0.6749	0.9873	(Duration = 27)xln(UR)	-1.1699	0.5393
Duration = 28	0.3540	1.1137	(Duration = 28)xln(UR)	-0.9847	0.6130
Duration = 29	0.6197	1.1569	(Duration = 29)xln(UR)	-1.0660	0.6440
Duration = 30	-0.2503	1.4726	(Duration = 30)xln(UR)	-0.8766	0.8255
Duration = 31	-2.1234	1.6041	(Duration = 31)xln(UR)	0.3243	0.8652
Duration > 31	0.9699	0.9172	(Duration > 31)xln(UR)	-1.4714	0.5306

Seasonal Effects					
First Quarter	0	-	Third Quarter	0.0832	0.0079
Second Quarter	-0.0032	0.0079	Fourth Quarter	-0.1761	0.0081
Regional Effects					
South East	0	-	Yorkshire and Humberside	0.0426	0.0101
East Anglia	0.1147	0.0166	North West	0.0051	0.0093
South West	0.0805	0.0112	North	0.0180	0.0114
West Midlands	-0.0144	0.0104	Wales	0.0362	0.0129
East Midlands	0.0445	0.0122	Scotland	0.0435	0.0100
			Northern Ireland	-0.1070	0.0298
Age Effects					
18-24 years	0	-	40-44 years	-0.1985	0.0114
25-29 years	-0.1147	0.0082	45-49 years	-0.1914	0.0119
30-34 years	-0.1447	0.0097	50-54 years	-0.2503	0.0125
35-39 years	-0.1936	0.0107	55-59 years	-0.1936	0.0153
Effects of Marital Status			Inflow Heterogeneity		
Not Single	0	-	Ln(UR)	0.7948	0.0253
Single	-0.1052	0.0068	First Quarter	0	-
Unobserved Heterogeneity			Second Quarter	0.0318	0.0081
Second Support Point not Significant			Third Quarter	0.0372	0.0080
			Fourth Quarter	0.0759	0.0081

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