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Unemployment Insurance in Europe: Unemployment Duration and Subsequent Employment Stability[#]

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Abstract

This article provides evidence on the effect of unemployment insurance on unemployment and subsequent employment duration in Europe using individual data from the European Community Household Panel. Country-specific estimates based on a multivariate discrete-time duration model, which takes into account dynamic selection issues and the endogeneity of benefit receipt, suggest that although receiving benefits has an adverse effect in the sense of increasing unemployment duration, there is also a positive effect associated with the increased duration of subsequent employment. This beneficial effect of unemployment insurance on employment stability is pronounced in countries with relatively generous benefit systems, and for recipients who have remained unemployed for at least six months. These findings are in line with theories that suggest a matching effect of unemployment insurance.

Keywords: Unemployment Insurance; Unemployment Duration; Employment Stability; Job Match Quality; Unobserved Heterogeneity
JEL Classification: J64; J65; C41

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1. Introduction

That unemployment insurance (UI) has disincentive effects on job seeking behavior and on unemployment duration is the conventional wisdom in modern labor economics. Policy recommendations often suggest a reduction in the generosity of UI as a way to remove these disincentives. By focusing only on the disincentives of UI, however, such policy discussions fail to take into account the potential beneficial effects of UI on post-unemployment outcomes. By allowing more time and more resources for search, generous unemployment benefits may improve the match between the unemployed and the available job vacancies. Consideration of these positive features of the UI system is very relevant in the European context. The challenge of achieving full employment is a long-term target, which requires not just attracting more individuals to the labor market but also ensuring employment stability. Surprisingly given their policy relevance, there is no empirical evidence for Europe estimating the two effects.

This paper contributes to the empirical literature by modeling both unemployment and employment transitions for a number of European countries employing individual level data from the European Community Household Panel (ECHP). The analysis focuses on the effect of benefit receipt on unemployment duration and on subsequent employment duration, which is a measure of employment stability, including job-to-job transitions. The main novelty of the paper is that it considers a number of countries which vary in the generosity of the UI system and belong to different institutional regimes. This allows us to examine to what extent the effect of UI varies across countries.

The econometric analysis adopts a reduced-form approach by estimating a multivariate discrete-time hazard model addressing two important issues: (a)

the endogeneity of benefit receipt, and (b) the endogeneity of previous unemployment duration on subsequent employment duration. The effect of UI is identified by a comparison between recipients' and non-recipients' outcomes. Unlike many other studies which identify the effect of UI benefits by using variation in the level and potential duration of benefits, the ECHP provides limited information on these features of the UI system. Instead, a time-varying indicator of benefit receipt can be constructed. Identification of the effect of benefit receipt relies on observing multiple unemployment and employment spells. Moreover, by allowing for unobserved heterogeneity in the selection equation to be correlated with the transition equations, the selection effect is identified separately from the causal effect of receiving benefits.

The empirical results suggest that receiving unemployment benefits significantly reduces the hazard of leaving unemployment, leading to longer unemployment duration. Moreover, the effect of receiving benefits on unemployment duration is larger in countries with relatively more generous UI systems, such as Denmark, France, Germany, and Spain compared to countries such as Greece and Italy, in which the UI system is underdeveloped. Despite this, there is a beneficial effect of UI on subsequent employment stability. Specifically, the hazard rate out of employment is lower for previously unemployed benefit recipients relative to non-recipients. This effect is pronounced (a) in those countries with relatively more generous benefit systems, and (b) for recipients who have spent at least 6 months in unemployment. These findings are in line with the hypothesis that UI has beneficial effects on post-unemployment outcomes and suggest that the magnitude of the effects varies by the generosity of the UI system.

The rest of the paper is organized as follows. Section 2 outlines the theoretical framework and the existing empirical evidence, while Section 3 describes the data employed for this study. The econometric model is presented in Section 4, and the results of the empirical analysis in Section 5. The conclusions of the study are drawn in the last section.

2. Theoretical Arguments and Empirical Evidence

The job search paradigm is the dominant theoretical tool used to analyze the behaviour of unemployed workers searching for a job (see Lippman and McCall, 1979). Whether set in a partial or in a general equilibrium setting, standard search theory predicts that an increase in UI benefit generosity increases the duration of unemployment. Unemployed workers exert lower search effort as the opportunity cost of search is lower and they choose higher reservation wages. Moreover, closer to benefit exhaustion, the value of unemployment drops since the marginal benefit of search increases and the reservation wage falls, leading to a higher exit rate out of unemployment (Mortensen, 1977; Burdett, 1979). Empirical studies find evidence that the probability of escaping unemployment rises when unemployment benefits lapse (Ham and Rea, 1987; Meyer, 1990).[1]

At the same time, UI benefit generosity may also affect post unemployment outcomes by improving job matching. Ehrenberg and Oaxaca (1976) were the first to consider the effect of UI on post-unemployment

[1] See Devine and Kiefer (1991) and Atkinson and Micklewright (1991) for surveys of the related literature.

outcomes finding a positive effect of benefits on post-unemployment wages.[2] Quantifying the beneficial effect of UI on post unemployment outcomes has been challenging due to the scarcity of large micro data sets with information both on labor market histories and UI benefits. Because wages are not the only state variable sufficient to summarize individual well-being, this strand of the literature measures the effect of UI generosity on post unemployment outcomes with the incidence of unemployment, or the time elapsed between re-employment and acceptance of a subsequent job, using job matching arguments based on Jovanovic (1979).

In a series of papers, Belzil (1992, 1995 and 2001) analyzes unemployment experience and employment duration in the context of the Canadian UI reform finding that the incidence of voluntary unemployment is positively correlated with the duration of the preceding spell of unemployment and benefit exhaustion, and a weak positive relationship between re-employment duration and unemployment benefit generosity. Recently, Centeno (2004) studies the effect of the generosity of US benefit levels and finds that larger UI benefits lead to longer subsequent employment spells. Van Ours and Vodopivec (2008) investigate the effect of reducing the potential duration of unemployment benefits in Slovenia and find that it strongly increased job finding rates but had no effect on the quality of post-unemployment jobs[3]

The macro literature has also devoted interest to the lifecycle effects of

[2] More recently, Addison and Blackburn (2000) review the literature and provide results which suggest a weak effect of UI on re-employment wages.

[3] Baker and Rea (1998), focusing on a single duration, analyze the impact of benefit duration on the exit out of the current job in Canada using temporary layoff arguments based on Feldstein (1976). For a study using U.S. data see Jurajda (2002).

UI. Hansen and Imrohoroglu (1992), focusing on the consumption smoothing and the disincentive effect of UI, show that even in the presence of moral hazard optimally designed unemployment insurance programs can yield positive welfare benefits. The utility gain of a generous UI through consumption smoothing has been empirically documented by Gruber (1997). Acemoglu and Shimer (1999) show that the increased utility of unemployment when receiving UI induces workers to search for higher wages and firms respond by creating high-wage, high-quality jobs. The role of UI as a "search subsidy", which may improve the allocation of resources, has been demonstrated by Burdett (1979). This channel suggests that benefits have an effect on the subsequent employment duration by helping workers to get jobs which are compatible with their skills and therefore less likely to dissolve (Marimon and Zilibotti, 1999).

3. The Data

The analysis in this paper is based on individual data from the European Community Household Panel (ECHP, 1994-2001). The ECHP is a survey based on a standardized questionnaire with annual interviewing of a representative panel of households and individuals of the population in each country, covering a wide range of topics including demographics, employment characteristics, education etc. In the first wave, a sample of some 60,500 households - approximately 130,000 adults aged 16 years and over - were interviewed in the then 12 Member States. There are three characteristics that make the ECHP relevant to this study. The simultaneous coverage of employment status, the standardized methodology and procedures yielding comparable information across countries and the longitudinal design, in which

information on the same set of households and persons is gathered. The countries studied are Denmark, France, Germany, Greece, Ireland, Italy, Spain, and the U.K, which differ in the features of the UI system representing four different "institutional regimes" that prevail in Europe.

3.1 Institutional Regimes

The empirical literature has identified the generosity of unemployment insurance as a major factor affecting unemployment rates in Europe (Nickell et al., 2005). Unemployment insurance is the main scheme where eligibility is based upon previous employment and contribution histories. Unemployment assistance, which is not available in all countries, is usually means tested and it is available for those who exhaust unemployment insurance and those who are not eligible.

In general, it is difficult to rank the countries in terms of their generosity with respect to UI as the system depends on a number of parameters such as eligibility conditions, level and duration of payments. However, following Esping-Andersen (1990) and Bertola et al. (2000), one can broadly define four regimes: 1) The *universal welfare state* regime, which includes Denmark and the Scandinavian countries. This regime is characterized by flexible labor markets and generous welfare policies (flexicurity), which are financed by relatively high taxes on labor income and/or social security contributions. The UI system can be characterized as generous both in terms of the benefit level and benefit duration. 2) The *conservative welfare state* regime, which includes Germany, Austria, France, Belgium and the Netherlands. The main difference from the first regime is that, in principle, the social transfers are related to previous earnings and the means-tested social transfers act as a residual safety

net. In terms of generosity of the UI system, the universal and the conservative welfare state regimes can be considered to be relatively similar. 3) In *Southern-European* countries such as Italy, Greece, Spain and Portugal, the prevailing institutional regime relies on family ties rather than on social insurance. Compared to both the universal and the conservative welfare state regimes, mandatory social security contributions are relatively low. In terms of the UI system, these countries provide limited insurance, although some countries, such as Spain, resemble the second group in terms of generosity. 4) The *liberal welfare state* regime, which includes the United Kingdom and Ireland, features relatively flexible labor markets as well as means-tested social transfers with low income taxes and social security contributions compared to the universal and the conservative welfare regimes. The UI system provides flat rate payments with relatively short duration.

The eight countries analyzed in this study represent each of the four regimes in terms of important differences in the generosity of the UI system determining the labor market behavior of the unemployed. Details on the main characteristics of the UI system (eligibility conditions, payment rate and duration) and the differences across these countries are summarized in Table B.1 in Appendix B.

3.2 Inflow Sample and Transitions

Using the monthly calendar of labor market activities for the years 1994-2001, individual labor market histories are constructed up to December 2000. The sample consists of all the flow spells from employment into unemployment such that all unemployment spells occur at the end of an ongoing employment spell. The analysis is focused on 20-60-year-old males because of their higher

attachment to the labor market. It is important to note that following the transitions of each individual over time implies that multiple spells of unemployment and employment are recorded. This allows for sufficient variation for the identification of the model as discussed in the next section.[4]

Unemployment spells can end in one of the following two ways: by re-entering employment, or by leaving the labor force. Unemployment spells that last longer than the end of 2000 are treated as right censored. Transitions from unemployment to employment are considered as completed spells, while transitions from unemployment out of the labor force are considered as continued unemployment spells. That is, the duration of unemployment for those who have been out of the labor force is the sum of the duration of the initial unemployment spell and the duration of the spell out of the labor force. This is consistent with the fact that the majority of those unemployed who exit to inactivity either re-enter unemployment, or enter directly into employment.[5]

Transitions in the sample are depicted in Table 1, where the first column shows the number of unemployment spells observed for each country. Between 63% (Germany) and 78% (Greece) of these unemployment spells end in employment. The third column depicts the share of those employment spells which end back in unemployment. This varies from 27% (U.K.) to 63%

[4] The countries not considered in the analysis include the Netherlands and Sweden, for which the information from the calendar of activities is not reported; Austria and Finland, which entered the ECHP in 1995 and 1996, respectively, and Belgium and Portugal. For the last four, the inflow unemployment sample is small so there is no sufficient variation in the transitions to identify the main parameters of interest.

[5] The alternative is to treat those who exit to inactivity as right censored unemployment spells. The sensitivity of the results under this alternative assumption is discussed in section 5.4.1.

(Greece). For Italy, Spain and Greece the percentage of employment spells which end in unemployment is much higher. These are also countries with an unemployment rate above the European average.

[Table 1 about here]

3.3 Description of Data on Unemployment Insurance

The effect of UI is identified by a comparison between recipients' and non-recipients' outcomes. This approach is in contrast to many other studies which identify the effect of benefits by using variation in the level and potential duration of benefits (e.g. Belzil, 1995, 2001; Card and Levine, 2000; Katz and Meyer, 1990; Lalive and Zweimüller, 2004; Van Ours and Vodopivec, 2008) using primarily administrative data.

The reason for following this approach is that the information related to unemployment insurance in the ECHP is rather limited and it is based on two main sources: a) whether an unemployed person receives benefits at the time of the interview and b) the amount of benefits received during the year. The first, however, is not informative for short spells that might not coincide with the time of any interview, and the second is not sufficient to construct the benefit level for a particular unemployment spell, as an individual might be unemployed twice during a year. Consequently, both sources of information in the data are used to distinguish recipients from non-recipients and to construct a measure of benefit duration. This constructed benefit duration variable, which coincides with unemployment duration for those who still received benefits at the end of the unemployment spell, is used to define a time-varying indicator of receiving benefits during each month of an unemployment spell. This benefit indicator equals one if an unemployed person still receives benefits during the

spell and zero otherwise.[6]

Table 2 shows summary statistics of the unemployment spells in the sample. The first column for each country refers to those receiving benefits during unemployment, while the second column refers to the non-recipients. Benefit recipients tend to be less educated, older, more likely to be married with more children and to have spouses who are non-employed. Moreover, they experience longer average unemployment duration than non-recipients. Benefit receipt depends on the eligibility criteria, which differ across countries, and is related to previous employment history and other individual characteristics. The observed variation across countries in the share of the unemployed receiving benefits reflects the different eligibility criteria that apply to each country.

[Table 2 about here]

3.4 Kaplan-Meier Survivor Functions

A preliminary analysis for the effect of UI based on the Kaplan-Meier survivor functions for recipients and non-recipients is presented in Table 3. The first panel, which refers to the unemployment spells, indicates that the percentage of recipients who are still unemployed after 12 months is higher in comparison to non-recipients. For instance, 48% of recipients in France are still unemployed after 12 months compared to 36% for non-recipients. The survival rate after 12 months for recipients vs. non-recipients for Germany is 49% vs. 28%, for Ireland 36% vs. 20%, for Spain 31% vs. 22%, and for the U.K. 43% vs. 26%. The second panel of Table 3 depicts the survival rate for employment spells

[6] A detailed discussion on the use of the available information in the data to construct the benefit indicator and the benefit duration can be found in Appendix A. Section 4 introduces notation and discusses the use of the time-varying benefit indicator in the statistical model which is analyzed.

stratified by benefit receipt during the previous unemployment spell. After 12 months in employment, the percentage of those who survived is higher for previously unemployed recipients in Denmark, France, and Germany.

[Table 3 about here]

The analysis, however, of employment histories based on a simple comparison of survival rates between recipients and non-recipients might be confounded by individual characteristics associated with benefit receipt. Moreover, dynamic selection might exist due to unobserved characteristics that can be correlated across the two states. To address these issues, a statistical model is required that takes both the endogeneity of benefits and the dynamic selection due to unobserved heterogeneity into account.

4. Econometric Analysis

4.1 The Statistical Model

The econometric analysis of unemployment and employment duration is based on a multivariate discrete-time duration model. According to the standard job search model, the per-period escape rate out of unemployment is equal to the arrival rate of job offers times the probability that an offer will be accepted. This motivates the estimation of transitions out of unemployment by means of unemployment hazard functions. The hazard function which is defined as the probability that the spell is completed at time t, given that it has not been completed before t, is the basic building block of the discrete-time duration model. The job offer arrival probability is a function of personal characteristics and labor market conditions, while the acceptance probability is a function of leisure preferences and income from unemployment benefits. The transitions out of employment can be modeled similarly by means of employment hazard

functions, which depend on previous receipt of unemployment insurance, previous unemployment duration and on the elapsed time in employment. This framework is consistent with the job matching model of Jovanovic (1979). This reduced-form approach is also consistent with both theories of job search and job matching, which focus on the rate at which individuals leave the state at duration t given that they have not yet done so.

Given our data, the exact benefit duration is not available. What is observed is whether the benefit entitlement is as long as the unemployment duration. Therefore, both unemployment duration (T_u), employment duration (T_e), and benefit entitlement duration (T_b) are treated as discrete random variables that are subject to censoring. While censoring of unemployment and employment duration refers to the situation in which an individual is still in the state at the time of leaving the sample, censoring of the benefit entitlement duration depends on being shorter than unemployment duration. That is, T_b is observed if ($T_b < T_u$) and equals to T_u otherwise. This feature of the data is similar to Bover et al. (2002) and motivates as the basis for the empirical analysis of the relationship between T_u and B the hazard functions

$$\begin{aligned} \lambda_{0u}(t_u) &= P[T_u = t_u \mid T_u \geq t_u, T_b < t_u] \\ \lambda_{1u}(t_u) &= P[T_u = t_u \mid T_u \geq t_u, T_b \geq t_u] \end{aligned} \qquad (1)$$

where t_u denotes realizations of the stochastic duration of an unemployment spell T_u. The hazard function $\lambda_{0u}(t_u)$ defines the probability of exiting unemployment at t_u conditional on being unemployed until t_u for those who do not receive benefits at t_u. Similarly, the function $\lambda_{1u}(t_u)$ defines the probability of exiting unemployment for those who still receive benefits at t_u.

Formulating the analysis in terms of the hazard functions has an advantage relative to a regression or correlation analysis between T_u and T_b, which is difficult to interpret. The difficulty in interpreting a regression between T_u and T_b stems from the fact that, with limited benefit duration, individuals who do not receive benefits anymore tend to exhibit longer unemployment duration. However, the comparison between the hazard functions in equation (1) is meaningful because both probabilities are conditional on being unemployed for t_u periods (see Bover, et al. 2002, pp. 234).

Relying on the observed censored benefit duration instead of the benefit entitlement durations has the drawback that it is not possible to identify how the unemployment hazard rate for recipients changes closer to the time of benefit exhaustion. In theory, the hazard rate is expected to increase as the time of benefit exhaustion approaches (Mortensen, 1977; Burdett, 1979). Therefore, specifying the hazard function $\lambda_{1u}(t_u)$ for unemployed recipients, which does not vary as benefit exhaustion approaches, has two implications. For those whose benefit exhaustion occurs before t_u, the hazard based on $\lambda_{1u}(t_u)$ will be overestimated. Hence, the difference with respect to non-recipients will be underestimated. In contrast, for recipients at t_u who are close to benefit exhaustion the hazard rate will be underestimated (as in theory their hazard is expected to increase closer to exhaustion), so the difference with respect to the non-recipients will be overestimated. Therefore, the estimated difference can be viewed as a weighted average of the differences between those without benefits and those with benefit entitlement greater than t_u. As the hazard rate is expected to change depending on the time to benefit exhaustion, the benefit

indicator $b(t_u) = I(T_b \geq t_u)$ is treated as predetermined and not as strictly exogenous. That is, the probability of exiting unemployment can be conditioned on the path of $b(t)$ up to t_u, but not on $b(t_u + 1)$, $b(t_u + 2)$, etc., as the entire path of benefit duration might affect the hazard for the individual.

4.2 Parameterization

Multiple spells of unemployment (u) and employment (e) can be observed for each individual. The hazard function for an individual i for a spell k from the state $j = u, e$ is defined as

$$\lambda_{jik}(t_{jik} \mid y_{jik}) = P[T_{jik} = t_{jik} \mid T_{jik} \geq t_{jik}, y_{jik}] = F(y_{jik}) \qquad (2)$$

where $F(\cdot)$ denotes a cumulative distribution function (cdf) which is specified below. For the unemployment spell, where $j = u$, the index y_{jik} is defined as

$$y_{uik} = \beta_{0u} + \beta_{1u} \cdot X_{uik} + \delta_u \cdot b_{ik}(t_u) + \sum_{d=1}^{4} \beta_{2u} \cdot I_{ikd}(t_u) \qquad (3)$$

The benefit indicator $b_{ik}(t_u)$ has a subscript k which indicates that it is spell specific and, thus, might vary for the same individual across multiple unemployment spells. The vector X_{uik} includes personal characteristics and economic variables which refer to the year the unemployment spell started, and therefore they are fixed within a spell but allowed to vary across spells. Among the personal characteristics are age dummies, education dummies (defined using the ISCED classification), marital status, the number of children and whether the spouse is employed. The economic variables include the regional unemployment rate at the time of entering unemployment. The effect of duration dependence is modeled by using time dummy variables denoted as

$I_{ikd}(t_u)$, which are equal to one when duration t_u is within the duration intervals denoted by the subscript $d = (1,2,3,4)$. These intervals are defined as $d = 1$ for 1-6 months of duration, $d = 2$ for 7-12 months, $d = 3$ for 12-24 months, and $d = 4$ for more than 24 months. For the employment spell, where $j = e$, the index y_{jik} is defined as:

$$y_{eik} = \beta_{0e} + \beta_{1e} \cdot X_{eik} + \delta_{1e} \cdot b_{eik} + \sum_{d_u=1}^{3} \delta_{2e} \cdot \tau_{d_u ik} + \sum_{d=1}^{4} \beta_{2e} \cdot I_{ikd}(t_e) \quad (4)$$

where t_e denotes realizations of the stochastic duration of an employment spell T_e. The variable b_{eik} is a dummy for the individual having received benefits during the previous unemployment spell k. The vector X_{eik} includes personal characteristics and economic variables, similar to the unemployment hazard, which refer to the year the employment spell started and that are fixed within a spell but also allowed to vary across multiple employment spells. The specification additionally includes a dummy for being employed in a part time job in the vector X_{eik} and three interval dummies for the previous unemployment duration, denoted as $\tau_{d_u ik}$, where $d_u = (1,2,3)$. Finally, the effect of duration dependence is modeled by using time dummy variables denoted as $I_{ikd}(t_e)$, which are defined similarly as in the unemployment hazard. The intervals for the duration dependence and the dependence on previous unemployment duration in the employment hazard are chosen in order to reflect the distinction between the short- and long-term unemployed, as they are usually defined.

Using the hazard functions in equation (2), the contribution of the unemployment and employment spells to the likelihood can be defined for each

individual for a given spell. Let T_j^0 denote the observed censored duration for $j = u, e$ so that $T_j^0 = T_j$ if $T_j < C_j$ and $T_j^0 = C_j$ otherwise, where C_j is the censored observed duration. The contribution of a completed unemployment and employment spell is given by the conditional density function[7]

$$f_j(t_j \mid .) = \lambda_j(t_j \mid .) \prod_{t_j=1}^{T_j^0 - 1} (1 - \lambda_j(t_j \mid .)) \tag{5}$$

while the contribution of a censored spell is given by the conditional survival function

$$S_j(t_j \mid .) = \prod_{t_j=1}^{T_j^0} (1 - \lambda_j(t_j \mid .)) \tag{6}$$

The total sample likelihood is given by the product of the individual likelihoods

$$L(\theta) = \prod_{i=1}^{N} L_u(\theta_u) L_e^{c_u}(\theta_e) \tag{7}$$

where $L_j(\theta) = [f_j(t_j \mid .)]^{c_j} [S_j(t_j \mid .)]^{1-c_j}, \theta$ (θ_u and θ_e) are the parameters to be estimated and N is the number of spells. The dummies c_j equal one for a completed spell ($T_j < C_j$) and zero for a censored spell ($T_j = C_j$). Note that the employment spells are contributing to the likelihood when the unemployment spell is not censored ($c_u = 1$). Following Narendranathan and Stewart (1993), Sueyoshi (1995), Jenkins (1995) and Bover et al. (2002), the likelihood in equation (7) can be written in the form of a standard log-likelihood function for binary variables as

$$\log L_j = \sum_{i=1}^{N} 1(T_j^0 \geq t_j) \left\{ c_j Y_{t_j} \log \lambda_j(t_j) + (1 - c_j Y_{t_j}) \log \left[1 - \lambda_j(t_j) \right] \right\} \tag{8}$$

[7] Abstracting from i and k and making the conditioning on y_{jik} implicit.

where Y_{t_j} equals to one if the observed duration equals to t_j, that is, $Y_{t_j} = 1$ if $T_j^0 \geq t_j$. Combining L_j for all observed durations the sample log likelihood can be written as

$$\log L(\theta) = \sum_{i=1}^{N} \{ l_u(\theta_u) + c_u l_e(\theta_e) \} \tag{9}$$

where for $j = u, e$

$$l_j(\theta_j) = c_j \left\{ \sum_{t_j=1}^{T_j^0 - 1} \log\left[1 - \lambda_j(t_j)\right] + \log \lambda_j(T_j^0) \right\} + \left(1 - c_j\right) \sum_{t_j=1}^{T_j^0} \log\left[1 - \lambda_j(t_j)\right] \tag{10}$$

To estimate the model it is necessary to specify an expression for the hazard rate. Following the standard practice in the literature (see, for instance, Cameron and Heckman, 1998; Bover et al., 2002; Ham and LaLonde, 1996, among others), the hazard is specified as the logistic so that in equation (2), $\lambda_j = F(z) = e^z / (1 + e^z)$.[8]

4.3 Unobserved Heterogeneity and Endogeneity of Benefits

The model so far assumes that all the individual variation in the hazard functions can be characterized by the observed explanatory variables and that the transitions across unemployment and employment are independent. In the presence of unobserved individual characteristics, however, such as motivation

[8] An alternative specification is the complementary log-log, which has the property that the resulting model is the discrete-time counterpart of the underlying continuous-time proportional hazards model (see Prentice and Gloeckler, 1978). Sueyoshi (1995) shows that a binary response hazard model, employing a logit specification, will be slightly less proportional than the extreme value specification, while a probit specification will tend to depart from proportionality far more than the logistic models.

or unobserved human capital variables, the coefficient estimates of the effect of benefits and duration dependence are expected to be downward biased. The reason is that dynamic selection occurs since those with high values of the unobserved variables on average exit unemployment faster. Hence, individuals who are still unemployed at high durations tend to have lower values of the unobserved variables and thus lower hazards. This leads to spurious negative duration dependence and to a lower observed difference in the hazards between recipients and non-recipients than the true average difference. The latter happens as the sample of non-recipient survivors, who have a higher hazard, has on average lower values of the unobserved variables than the sample of recipient survivors. A similar selection due to unobserved heterogeneity might occur in the employment state. To address these dynamic selection issues the model is extended to allow for correlated unobserved heterogeneity relaxing the assumption of independent transitions.

The hazard functions, allowing for unobserved heterogeneity, can be written as

$$\lambda_{jik}(t_{jik} \mid y_{jik}, \varepsilon_{ji}) = F(y_{jik}) \tag{11}$$

where the error terms ε_{ji} enter additively in the index y_{jik}, which are defined in equations (3) and (4) for the unemployment and the employment hazard, respectively. One issue that arises in the presence of unobserved heterogeneity is that the benefit indicator in the unemployment hazard, which is a predetermined variable, is endogenous as it is correlated with the unobserved term. The endogeneity of benefits is addressed by specifying a reduced form process for $b(t_u)$. This procedure follows Bover et al. (2002), who consider a single spell model of unemployment duration, and is analogous to the treatment

of initial conditions by Ham and LaLonde (1996) in their evaluation of training on a multivariate model of unemployment and employment spells.

The process for benefits specified as the probability to receive benefits at each period conditional on having received benefits up to that period can be written as

$$\lambda_{bik}(t_{bik} \mid y_{bik}, \varepsilon_{bi}) = P[b_{ik}(t_b) = 1 \mid b_{ik}(t_b - 1) = 1, T_{bik} \geq t_{bik}, \varepsilon_{bi}] = F(y_{bik}) \quad (12)$$

where F is the logistic cdf and the index is defined as

$$y_{bik} = \beta_{0b} + \beta_{1b} \cdot X_{bik} + \sum_{d=1}^{4} \beta_{2b} \cdot I_{ikd}(t_b) + \varepsilon_{bi} \quad (13)$$

The vector of characteristics X_{bik} and the duration dummies $I_{ikd}(t_b)$ are defined similarly to the ones in the specification of the unemployment hazard and ε_b is the individual unobserved term that is associated with benefit receipt.

Combining the unemployment transitions with the logistic process for benefits and the employment transitions, the joint log-likelihood defined as $\log L(\theta, \varepsilon_u, \varepsilon_b, \varepsilon_e)$ is equal to

$$\sum_{i=1}^{N} \log \iiint \exp\{[l_u(\theta_u, \varepsilon_u) + l_b(\theta_b, \varepsilon_b)] + c_u[l_e(\theta_e, \varepsilon_e)]\} dG(\varepsilon_u, \varepsilon_b, \varepsilon_e) \quad (14)$$

where $l_u(\theta_u, \varepsilon_u)$ and $l_e(\theta_e, \varepsilon_e)$ are defined as in equation (10) and $l_b(\theta_b, \varepsilon_b)$ is defined as

$$\sum_{t_u=1}^{T_u^0} b(t_b - 1)\left\{b(t_b)\log \lambda_b(t_b, \varepsilon_b) + (1 - b(t_b))\log\left[1 - \lambda_b(t_b, \varepsilon_b)\right]\right\} \quad (15)$$

with $b(0) = 1$ for all i.

Following Heckman and Singer (1984), the unobserved heterogeneity distribution is defined as a discrete distribution with the support points denoted

by $(\varepsilon_{u,p}, \varepsilon_{b,p}, \varepsilon_{e,p})$ and the corresponding probability mass given by $\Pr(\varepsilon_u = \varepsilon_{u,p}, \varepsilon_b = \varepsilon_{b,p}, \varepsilon_e = \varepsilon_{e,p}) = \pi_p$, where P denotes the number of support points. Each unobserved factor is assumed to be time invariant and individual-specific for each state. That is, it is the same across multiple spells of unemployment or employment. However, the unobserved factors are allowed to be different and correlated across unemployment and employment spells. Introducing an unobserved factor in the benefits selection equation, which can be correlated with the unemployment and employment transitions, captures selection effects across these transitions. The sample log-likelihood can be written as follows

$$\log L = \sum_{p=1}^{P} \pi_p \log L_p \tag{16}$$

where $\log L_p$ is defined as in equation (14) for a specific mass point p. The model is estimated jointly by maximum likelihood.

4.4 Identification

Identification for a general class of univariate single spell discrete-time duration models is discussed by Cameron and Heckman (1998). They show that identification is enhanced if the index varies with duration, which is satisfied as the benefit indicator is a time-varying variable. Even with a constant index, their Theorem 4 shows that the model is identified if attention is restricted to finite mixture distributions of the type defined in the previous subsection. It is important to note that the data do not provide information on drawing from the mixing distribution of unobserved characteristics G in equation (18). The information on G comes from the observed interaction

between duration t and the observed individual characteristics. As with linear panel data models, observing multiple outcomes for given unobserved heterogeneity values can be exploited to deal with unobserved heterogeneity under conditions that are mild relative to the single-spell case (Abbring and Van den Berg, 2003).

Identification of the model in the context of this paper with a benefit selection equation relies on observing multiple unemployment spells, which provide within-worker variation on the benefit indicator. The variation of the benefit indicator for an individual across multiple spells of unemployment is due to the eligibility criteria that dictate when an unemployed is eligible to receive UI. By exploiting this variation at the individual level and allowing unobserved heterogeneity in the selection equation to be correlated with the unemployment transition equation, the selection effect into benefits is identified separately from the causal effect of receiving benefits on unemployment duration. As an example of such selection one can think of individuals who are more likely to be benefit recipients and also less likely to be re-employed because of unobserved differences in their labor market attachment.

Even if the receipt of UI were exogenously determined in the sense of a natural experiment, the sample observed making a transition into employment might be a selected sample of the initial flow sample into unemployment due to the effect of unobserved heterogeneity. To distinguish, therefore, the causal effect of benefits from a spurious one both the unemployment and employment transitions are modeled jointly taking into account this selection by way of correlated unobserved heterogeneity.

5. Empirical Results

The model described in the previous section is estimated for each country separately. The results for the effect of benefits on both unemployment and employment transitions are presented first in section 5.1, followed by the estimates for duration dependence and the distribution of unobserved heterogeneity in section 5.2, and finally by the estimates of the other characteristics in section 5.3. Sensitivity analysis is presented in section 5.4 and some simulations in section 5.5.

5.1 The Effect of Unemployment Benefits

Table 4 reports the coefficient estimates of unemployment benefit receipt for both unemployment and employment transitions. As discussed in section 4, the effect of benefits on unemployment duration is captured by the time-varying benefit indicator $b(t_u)$. For the employment duration, the effect of benefits is captured by the dummy variable (b_{ek}), which equals one for those who have received benefits during the previous unemployment spell and zero for the non-recipients. To check the sensitivity of the benefit effect on the employment duration, two specifications are estimated. The first *(Employment I)* includes only the benefit dummy, while the second one *(Employment II)* allows for an interaction of the benefit dummy with previous unemployment duration. The motivation is to identify any heterogeneous effects of benefits on employment stability for different unemployment experiences. If benefits provide the time to find a better job by increasing the available information to the worker, then the

effect on employment stability is expected to be larger for those who have searched for a longer time period.[9]

[Table 4 about here]

5.1.1 Unemployment Hazard. The results indicate that receiving unemployment benefits has a significant negative effect on the unemployment hazard, which is a standard result in the literature. A comparison of the size of the coefficients across countries shows that the effects vary in a way which seems to be correlated with the generosity of the UI system. In particular, the effect is larger in countries which belong to more generous welfare state regimes such as Germany (-0.555) and France (-0.422) in the *conservative regime*, and Denmark (-0.486) in the *universal* one. This is also the case for the effect for Spain (-0.412), which more closely resembles the *conservative* regime in terms of UI generosity. Lower effects are observed for Italy and Greece, which belong to the *Southern-European* regime with less generous benefits.

Finally, for Ireland, which belongs to *liberal* welfare state regime, the effect of receiving benefits is not significant. For the U.K., however, a large negative and significant effect is observed. This effect is likely to be over-estimated for two reasons. The first is related to the way exits to inactivity are treated. As discussed later in section 5.4.1, when those spells that end in inactivity are considered as right censored spells and not as continued unemployment spells, the coefficient drops to (-0.411). The second is related to the data preparation steps described in Appendix A, according to which very short spells that are typically re-entries to unemployment after a short

[9] Polachek and Xiang (2006) find that, in countries that strongly support UI, workers receive wages closer to their potential as a result of a longer search period which reduces incomplete information.

employment spell are considered as non-recipients. Therefore, the difference in the hazard between recipients and non-recipients (with shorter durations) is likely to be overestimated.

5.1.2 Employment Hazard. The effect of having received benefits during the previous unemployment spell (*Employment I*) has a negative effect on the hazard from subsequent employment in all countries. That is, although receiving benefits lowers the unemployment hazard, the overall evidence suggests that recipients experience longer post-unemployment employment duration. In terms of differences across countries, for those which belong to the more generous welfare state regimes (Denmark, France, Germany), the effects are larger and highly significant. For the countries with relatively less generous UI systems the effects are smaller (Greece, Italy) or not significant (Ireland). For these countries, the effect of UI on unemployment duration is also smaller.

Investigating the sensitivity of these results to the length of the previous unemployment duration, the estimates of the second specification (*Employment II*) suggest that the effect of benefit receipt is higher for those who exit unemployment after 6 months in countries with more generous welfare state regimes such as Denmark, France, and Germany. This is consistent with the idea that generous UI increase the quality of job match by providing with more time and more resources for search.[10]

5.2 Duration Dependence and Unobserved Heterogeneity

[10] Employment Protection Legislation (EPL) through firing costs might also have an effect on job duration and employment stability. However, the results are based on a comparison between recipients and non-recipients in each country conditional on observed and unobserved heterogeneity, so any other institutional characteristics such as EPL are fixed.

The model is estimated jointly allowing for unobserved characteristics such as motivation and preferences that might affect both the exit out of unemployment and subsequent employment. This might lead to a spurious correlation between unemployment duration and employment stability and spurious duration dependence, since those with more favorable labor market characteristics leave the state earlier.

5.2.1 Duration Dependence. Table 5 reports the coefficient estimates for duration dependence in both unemployment and employment hazard functions. To avoid imposing a functional form, duration dependence is captured in a flexible way by introducing duration dummies grouped in intervals of 6 months, with the reference category defined as the duration between 1 to 6 months. In the unemployment equation, the existence of negative duration dependence is observed in all countries. The negative effect on the hazard out of unemployment is larger the longer the time spent in unemployment. In the employment equation, there is a non-linear relationship between duration and the hazard rate. In particular in Germany, Greece, and Italy, workers in employment for 6 to 12 months are more likely to exit compared to those with less than 6 months. For the rest of the countries the effect is not significant. However, those who remain employed for more than 12 months are less likely to exit employment. In Denmark and Germany, negative duration dependence is significant for durations above 24 months.

[Table 5 about here]

5.2.2 Unobserved Heterogeneity. The distribution of unobserved heterogeneity is specified with two mass points $(\varepsilon_{u,1}, \varepsilon_{b,1}, \varepsilon_{e,1})$ and $(\varepsilon_{u,2}, \varepsilon_{b,2}, \varepsilon_{e,2})$, with

probabilities π_1 and π_2, respectively. For identification, with a constant term in the model the first mass point is normalized to zero so the second mass point is the deviation from the constant.

Allowing for two mass points is a very standard approach in hazard models (see Van Den Berg, 2001). Monte Carlo results by Baker and Melino (2000) show that in a single duration model with flexible duration dependence, adding additional mass points sacrifices efficiency and introduces a potentially very large bias, even in very large samples. On the other hand, ignoring unobserved heterogeneity leads to a negative bias in estimated duration dependence and biases the coefficients on observed heterogeneity towards zero. In the current specification with a vector of three unobserved random effects, one for each equation, there are two probabilities to be estimated with a mixing distribution that has a logit specification. Therefore, conditional on observed characteristics and the time spent in the current spell, there are two types of individuals that differ in their unemployment and employment hazards, and the probability to receive benefits.[11] Table 5 shows that in each country there is a group which has a higher exit rate both from unemployment and employment. The probability of the type with a high exit rate from unemployment and employment is about 65%-70% for Denmark, France and Germany, while it varies from 20% in Italy, to 30% in Greece, and 50% in Spain.[12]

[11] Sensitivity analysis which relaxes the restriction on the number of types and the number of mass points is discussed in section 5.4.3.

[12] In some countries one of the mass points in the benefit equation appeared to be very small. This can be caused by the small variation in the time varying benefit indicator. The time variation is achieved by benefit recipients exhausting benefits before leaving unemployment. In the estimation this parameter was fixed to minus infinity.

5.3 The Effect of Other Characteristics

The coefficient estimates for the other characteristics are reported in Table C.1 in Appendix C, which also includes the estimates of the benefit receipt equation. During the first month, this equation refers to the probability of receiving benefits after becoming unemployed, while in subsequent months it refers to the probability of being entitled to benefits having remained in unemployment up to that month and having received benefits in the previous month. These probabilities depend on the eligibility rules for unemployment insurance and the provision of the UI system in terms of benefit duration. Given the complexity of the rules and the fact that this equation is just an auxiliary reduced-form, there is no attempt to provide an interpretation of these coefficients. The focus of the following discussion will be based on the unemployment and employment hazards.

5.3.1 *Unemployment Hazard*. The main results for the effect of other individual characteristics on unemployment hazard can be summarized as follows:[13] the unemployed who are over 50 years old (the reference age group) have lower exit rates from unemployment, while those who are more educated, married, and have more children, are in general more likely to leave unemployment. The positive effect of secondary and higher education on the unemployment hazard is significant in France, Germany, Ireland, and Italy. For the U.K., a negative effect of secondary education on the unemployment hazard is observed, which is significant only at the 10% level, while for Greece and Denmark the effect is

[13] Each hazard function includes year dummies for the year entering unemployment and employment, respectively.

also negative but not significant. The effect of business cycle, as this is captured by the regional unemployment rate at the time of entry into unemployment, shows that a higher regional unemployment rate increases re-employment probabilities although the effect is insignificant, while there is a negative and significant effect for Italy.

5.3.2 *Employment Hazard*. The specification in the employment hazard includes dummies for previous unemployment spells of a length of 1-6 and 7-12 months, respectively. The reference group refers to those employed with duration of previous unemployment of more than 12 months. Controlling for the receipt of benefits and other individual characteristics, shorter previous unemployment experience is associated with lower hazard out of employment for France, Germany, and the U.K., although the coefficients are not significantly different from zero. In Italy and Spain, short unemployment duration increases the hazard from subsequent employment. The results for other characteristics can be summarized as follows: more educated, younger, married, and full-time workers are less likely to exit employment. The age effect seems to be reversed for France and Greece. For France, in particular, a large positive effect on employment hazard is observed for the age group 20-24 years old. The regional unemployment rate at the time of entering employment is positive and significant for Germany, Italy and Spain, suggesting a business cycle effect in which employment stability is worse in thin markets.

5.4 Sensitivity Analysis

5.4.1 *Exits to Inactivity*. The results of Table 4 are based on the inflow sample of the unemployed with those spells that end in inactivity being treated as

continued unemployment spells. To evaluate the sensitivity of this sampling strategy, the model is estimated treating the spells of those who exit to inactivity as right censored unemployment spells. Table C.2 presents the coefficients for the effect of UI on both the unemployment and employment hazards, which are similar with the results presented in Table 4. The only exception is the benefit coefficient in the unemployment equation for the U.K., which drops from -0.721 to -0.411. However, the benefit effect in the employment equation is not different between the two models.

5.4.2 *Heterogeneous Effect of Benefits across Education Groups.* From the analysis it so far appears that benefit receipt increases the duration of unemployment spells but also leads to more stable employment. Moreover, the size of the effects is related to the generosity of the UI system. Although the benefit level is not observed, the benefit level is in most cases a function of previous earnings, which is correlated with the education level, as, for instance, in Germany. To the extent that education is correlated with the level of benefits through earnings, it is possible to identify heterogeneous effects of benefit receipt for different education groups. Table C.3 reports the estimated coefficients of the main effect and its interaction with high and medium education. For the unemployment equation the interaction effects are not significantly different from zero. This suggests there is no heterogeneity in the effect of benefits across education groups in unemployment. For the employment equation, recipients with high education in Germany exhibit higher exit rates as compared to recipients with less than high education. This suggests some heterogeneity which might be related to an incentive effect to re-enter unemployment for highly educated workers who are entitled to higher

benefit levels. The opposite holds in Denmark, where the negative effect of benefit receipt on employment hazard is mainly found for highly educated workers.

5.4.3 *Sensitivity of the Unobserved Heterogeneity Specification*. The coefficient estimates of Table 4 and Table 5 are based on the model allowing for two mass points, so six parameters are estimated taking into account the normalizations and one free probability. Relaxing the restriction in the probabilities and considering all eight possible groups that can be formed the model is estimated with seven free probabilities. The coefficient estimates for the effect of benefits on the unemployment and employment hazards suggest that the results are not sensitive to this restriction. Only for France the coefficient of benefit receipt on unemployment duration exhibits a large drop from -0.422 to -0.248. However, the coefficient estimates for the employment hazard are very similar in the two models and the differences across countries are preserved. The model is also estimated allowing for three mass points with two free probabilities defined as:

$\Pr(\varepsilon_u = \varepsilon_{u,1}, \varepsilon_b = \varepsilon_{b,1}, \varepsilon_e = \varepsilon_{e,1}) = \pi_1$ and $\Pr(\varepsilon_u = \varepsilon_{u,2}, \varepsilon_b = \varepsilon_{b,2}, \varepsilon_e = \varepsilon_{e,2}) = \pi_2$

with $\pi_3 = 1 - \pi_1 - \pi_2$. As it is discussed in Section 5.2.2, Baker and Melino (2002) show that adding additional mass points sacrifices efficiency and introduces a potentially very large bias. The coefficient estimates based on this model reveal that such bias is present mostly for the unemployment hazard. For instance, the coefficient for France turns positive. For the employment hazard, the coefficient estimates are not altered and the main conclusion that the effect

of benefits on employment stability is larger in the countries with more generous unemployment insurance systems still holds.[14]

5.5 Simulated Survival Functions

Simulations of the survival function in unemployment and employment are performed for a reference individual to obtain a magnitude of the effect of benefit receipt. The reference person is defined as someone 25-29 years old with secondary education, married to a non-employed spouse, while the regional unemployment rate at the entry year into each state is kept at its mean value. The coefficient estimates from Model 1 (Table 4, 5, and C.1) are used for computing the survival rates, except for the U.K. Based on the discussion in the previous section related to the sensitivity of the estimates on the way exits to inactivity are treated, the survival rates for the U.K. are computed using the estimates from Table C.2, which treats exits to inactivity as right censored spells. The survival function is computed for the reference individual for each point of the discrete heterogeneity distribution and then weighted using the probability estimates for each point. Duration dependence is also taken into account. Standard errors are calculated by simulation from the estimated asymptotic distribution of the parameters.

Table 6 reports the simulated survival rate after 6 and 12 months in unemployment by benefit status for the reference individual, the corresponding standard errors and the t-statistics. The survival rates are in accordance with the estimates of Table 4. That is, recipients exhibit a higher survival rate in

[14] These results are not reported but are available from the author upon request. The log-likelihood values are reported in Table 5.

unemployment (i.e. lower hazard rate out of unemployment) compared to non-recipients with the effect being larger in countries with more generous UI benefits systems (e.g. Denmark, France, Germany and Spain). The difference in survival rates between recipients and non-recipients after 6 months in unemployment (denoted as U6 in Table 6) is 16 to 18 percentage points (p.p.) for Denmark and Germany, and 14 p.p. for France and Spain, while it is about 10 p.p. in Italy and Greece, which both have a much less generous UI system. After 12 months in unemployment, the difference in survival rates between the two groups of unemployed (denoted as U12) is similar, confirming that in countries with more generous benefits systems (Denmark, France, Germany, Spain) the relative exit rate from unemployment is lower compared to their counterparts in countries with less generous systems (Greece, Italy). Both differences - U6 and U12 - are significantly different from zero for Germany and Spain.

[Table 6 about here]

The simulated survival in employment after 6 and 12 months is also reported in Table 6, distinguishing between previously unemployed recipients and non-recipients with unemployment duration between 1-6 months who are now in a full-time job. In line with the coefficient estimates of Table 4, recipients exhibit a higher survival in employment compared to non-recipients. Interestingly, the magnitude of this effect varies across countries in a similar way that the magnitude of the effect of benefits varies in unemployment. In other words, for the countries with more generous benefits systems, such as Denmark, France, Germany and Spain, the difference in employment survival rates after 6 months between recipients and non-recipients (denoted as E6 in Table 6) is higher compared to countries with less generous systems, such as

Greece and Italy. In particular, the difference in survival in employment between recipients and non-recipients is about 17 p.p. for Denmark, 22 p.p. for France and 15 p.p. for Germany. In contrast, in Greece and Italy this difference is 3 p.p. and 5 p.p., respectively. The difference in Spain is 9 p.p., which rather resembles the first group in terms of generosity of the UI system. In terms of significance, these differences are statistically different from zero for France, Germany and Spain. After 12 months in employment, the difference in survival rates between the two groups of employed (denoted as E12) increases to about 30 p.p. in Denmark, France and Germany, and 14 p.p. in Spain, while it remains below 10 p.p. in Greece and Italy. Again, these differences are statistically significant for France, Germany and Spain.

Finally, a simple comparison of the differences in survival rates between recipients and non-recipients in employment and unemployment (E6-U6 and E12-U12) suggests that, for the group of countries which belong to the more generous welfare regimes, the net effect is zero after 6 months in employment and becomes positive after 12 months. Although this comparison does not result in a significant difference in statistical terms, it suggests that the beneficial effect of UI in terms of employment stability is sizeable, counteracting the disincentive effect of UI.

6. Conclusion

Unemployment insurance is known to create disincentives in searching and finding a new job. On the other hand, the potential beneficial effect of unemployment insurance on employment stability that results from improved job matching has been mostly ignored, especially in the European context. This paper contributes to the empirical literature by investigating the effect of UI on

unemployment duration and subsequent employment stability for eight European countries using individual data from the European Community Household Panel (ECHP, 1994-2001).

The findings suggest that although benefit recipients experience longer unemployment spells, UI also has a positive effect on subsequent employment stability. This effect of UI on post-unemployment stability is pronounced (a) in countries with relatively more generous UI systems such as Denmark, Germany, France and Spain when compared to countries such as Greece and Italy, in which the UI system is underdeveloped, and (b) for recipients who have spent at least 6 months in unemployment. These findings are consistent with the hypothesis that UI may have beneficial effects on post-unemployment outcomes. The magnitude of the effect of UI on employment stability varies by the generosity of the UI system and it is sizeable in countries with relatively more generous UI, counteracting the disincentive effect of UI.

In particular, recipients have survival rates in unemployment which are 15 p.p. higher than non-recipients in countries with more generous UI systems compared to only 10 p.p. in countries with less generous ones. The difference between the two groups of the unemployed in re-employment survival rates is about 17 p.p. in countries with generous UI and about 3 p.p-5 p.p. in the less generous ones. This difference in survival after 12 months in employment increases to about 30 p.p. for the first group of countries and only to about 10 p.p. for the second. Comparing the differences in survival rates between recipients and non-recipients in employment and unemployment suggests that, the net effect is zero after 6 months in employment and becomes positive after 12 months for the group of countries which belong to the more generous welfare regimes.

From a policy perspective, these findings suggest that in countries with low benefits - both in terms of level and duration - there is scope for increasing the generosity of UI to levels of more generous welfare regimes. This will lead – ceteris paribus – to positive effects in terms of employment stability and productivity due to the matching effect of better insurance. In countries with relatively generous UI systems, the findings suggest that reforms toward reducing its generosity as a way to reduce the disincentive effects might not be the optimal policy as they ignore the matching effect of UI. A better policy might be a system with generous benefits that delivers beneficial post-unemployment outcomes coupled with measures that increase the efficiency of the search process as a way to minimize the disincentive effects that generous UI can produce. This is in line with recent findings by Blanchard and Tirole (2008) on the joint design of UI and employment protection. They conclude that, in the presence of limits to insurance due to moral hazard in search, making unemployment benefits more explicitly conditional on search and acceptance of jobs can bring not only better insurance, but also lower employment protection and lower production inefficiencies. Future research with a cross-country perspective and better information on benefit levels and potential benefit duration should shed more light on the exact net effect of unemployment insurance and the extent to which this effect varies by the generosity of the UI system in place.

Appendix A: Construction of Benefit Variables

A1. Benefit Indicator

The benefit indicator is constructed using the two sources of information available at the ECHP, that is, whether receiving benefits if unemployed at the time of the interview, and the amount of benefits received during the year. Relying only on whether an unemployed receives benefits at the time of the interview can be uninformative for short spells, given that they might not coincide with the time of any interview. For instance, for spells of type C in Figure A.1, which are long enough to reach the time of the next interview, the information on receipt of benefits at the time of the next interview is used. However, this source of information is not sufficient to distinguish recipients and non-recipients for spells like A or B. For these spells, the information on the amount of benefits received during the year in which the spell has started is used. That is, a positive amount of benefits is associated with receipt of benefits.

[Figure A.1 about here]

The need to rely on the information for the amount of benefits received during a year, in order to identify benefit receipt, creates some difficulties in the case some individuals experience two unemployment spells within a year. The reason is that it is not immediately clear whether the amount of benefits received refers to the first, to the second, or to both spells. Notice that the spells in the sample start after the first interview in 1994 (Spells A, B or C). However, an individual could be unemployed twice in the year in which the first spell starts if another spell has started before the 1994 interview (Spell P) or if the individual re-enters unemployment after the first spell in the same year (Spells

A and A1, or B and B1).

For those who experience another unemployment spell (Spell P) before entering unemployment and receive benefits during the year of entry, both sources of information on benefits are used to infer the benefit status. That is, if the spell is long enough so that it reaches the month of the following interview (Spell C), the dummy for receiving benefits at the time of the interview at the next wave is used. If the spell is not long enough to reach the next interview but reaches the following year (Spell B), the amount of benefits received in the following year is used to infer whether the unemployed individual received benefits during this spell. Inference for spells of type A is not possible when another spell P exists and the unemployed person received benefits during that year. Another type of spells for which we cannot infer the benefit status is spells followed by another spell in the same year. This is shown in Figure A.1 as a combination of spells B and B1. If the individual receives benefits in both years, it is not possible to associate them with one of the two spells. Notice that in this case no spell coincides with a month in which the individual has been interviewed. The same holds for the combination of spells A and A1.

Therefore, it is possible to identify recipients and non-recipients, except for few cases in which the unemployment spell is very short and does not coincide with any month interview, or the individual experiences another spell before this spell and receives benefits in the same year. These spells are typically re-entries to unemployment after a short employment spell. Given the employment requirements for being eligible for benefits, these spells are less likely to be associated with benefits as they are preceded by a short employment spell. Therefore, they are considered as spells without benefits.

A.2 Benefit Duration

A measure of benefit duration is constructed using the two available sources of information on benefits and the unemployment duration. This constructed benefit duration variable coincides with unemployment duration for those who still receive benefits at the end of an unemployment spell. For instance, considering the spell of type C in Figure A.1, if the individual does not receive benefits at the time of the next interview but has received benefits during the year in which he entered unemployment, then he is considered as a benefit recipient who has exhausted benefits at the end of 1994. Similarly, if an unemployed person with a spell of type B receives benefits in 1994 but not in 1995, this spell is considered as if benefits were exhausted at the end of 1994. For long spells, a comparison of the benefit receipt indicator at the different waves provides information on benefit exhaustion. That is, if an unemployed individual receives benefits at the interview in wave 2 but not at the interview in wave 3, it is assumed that he has exhausted benefits at the end of 1995, given that he is still unemployed. Finally, for short spells of type A, benefit duration coincides with unemployment duration.

Appendix B: Features of Unemployment Insurance Systems

[Insert Table B.1]

Appendix C: Additional Estimation Results

[Insert Table C.1]

[Insert Table C.2]

[Insert Table C.3]

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Figure A.1

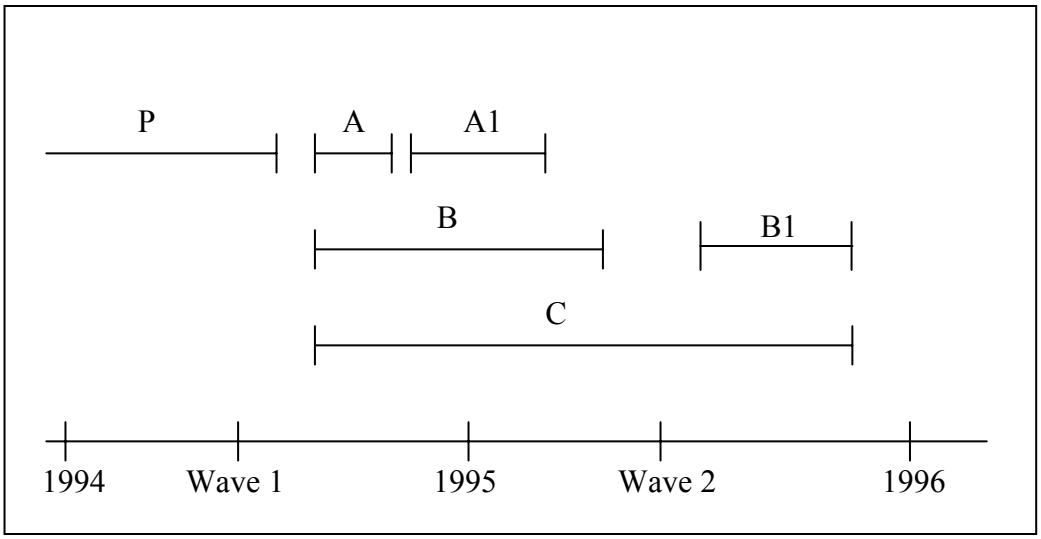

Table 1. Transitions in the sample by country.

	Number of Unemployment Spells	Number of Spells Exit to Employment	Number of Spells Exit to Unemployment
Denmark	344	258	89
		(75.00)	(34.50)
France	696	461	181
		(66.24)	(39.26)
Germany	1118	709	303
		(63.42)	(42.74)
Greece	948	740	472
		(78.06)	(63.78)
Ireland	413	307	88
		(74.33)	(28.66)
Italy	1276	943	518
		(73.90)	(54.93)
Spain	2372	1822	1015
		(76.81)	(55.71)
UK	507	395	106
		(77.91)	(26.84)

Source: ECHP (1994-2001) Own calculations. Percentages in parentheses.

Table 2. Summary statistics of unemployment spells by benefit status

	Denmark		France		Germany		Greece	
	B	NB	B	NB	B	NB	B	NB
% Receiving Benefits	0.686	0.314	0.590	0.410	0.658	0.342	0.266	0.734
Mean Duration	11.42	6.06	15.35	8.91	18.16	7.60	7.95	8.69
High Educ.	0.267	0.176	0.141	0.196	0.158	0.149	0.115	0.147
Medium Educ.	0.458	0.500	0.484	0.435	0.558	0.552	0.387	0.321
Low Educ.	0.275	0.324	0.375	0.368	0.282	0.298	0.498	0.532
Age	38.55	35.92	35.51	33.85	39.37	36.54	37.31	35.48
Married	0.466	0.389	0.433	0.411	0.631	0.563	0.628	0.524
No. of Kids	0.636	0.537	0.886	0.814	0.763	0.720	0.775	0.689
Spouse Non-Employed	0.246	0.204	0.299	0.242	0.332	0.275	0.415	0.324
	Ireland		Italy		Spain		UK	
	B	NB	B	NB	B	NB	B	NB
% Receiving Benefits	0.704	0.296	0.204	0.796	0.422	0.578	0.345	0.655
Mean Duration	12.08	7.16	8.16	12.01	11.30	7.82	13.89	10.09
High Educ.	0.058	0.115	0.042	0.038	0.098	0.116	0.371	0.346
Medium Educ.	0.357	0.352	0.272	0.299	0.151	0.208	0.137	0.169
Low Educ.	0.584	0.533	0.686	0.663	0.752	0.676	0.491	0.485
Age	35.97	36.43	39.16	33.52	37.52	32.76	36.41	35.11
Married	0.522	0.467	0.686	0.408	0.662	0.393	0.469	0.463
No. of Kids	1.268	1.057	0.908	0.555	0.900	0.661	0.931	0.894
Spouse Non-Employed	0.402	0.262	0.345	0.269	0.491	0.281	0.314	0.234

Source: ECHP(1994-2001) Own calculations. B denotes "Benefit Recipient" and NB "Non-Recipient".

Table 3. Empirical (Kaplan-Meier) Survivor Functions by Benefits Status

A. UNEMPLOYMENT SPELLS

	Denmark		France		Germany		Greece	
Months	B	NB	B	NB	B	NB	B	NB
1	0.970	0.972	0.978	0.944	0.982	0.935	0.964	0.968
6	0.466	0.300	0.648	0.516	0.666	0.432	0.327	0.426
12	0.303	0.199	0.484	0.362	0.497	0.282	0.201	0.227

	Ireland		Italy		Spain		UK	
Months	B	NB	B	NB	B	NB	B	NB
1	0.969	0.943	0.973	0.967	0.973	0.944	0.971	0.949
6	0.635	0.345	0.397	0.553	0.529	0.438	0.635	0.380
12	0.360	0.200	0.206	0.352	0.307	0.223	0.435	0.265

B. EMPLOYMENT SPELLS

	Denmark		France		Germany		Greece	
Months	B	NB	B	NB	B	NB	B	NB
1	0.994	0.974	0.989	0.985	0.996	0.983	0.990	0.993
6	0.879	0.865	0.845	0.747	0.909	0.843	0.675	0.766
12	0.748	0.771	0.727	0.592	0.719	0.674	0.273	0.488

	Ireland		Italy		Spain		UK	
Months	B	NB	B	NB	B	NB	B	NB
1	0.969	0.969	0.986	0.989	0.985	0.980	0.992	0.985
6	0.875	0.904	0.711	0.752	0.672	0.719	0.883	0.894
12	0.793	0.829	0.336	0.542	0.483	0.540	0.822	0.823

Notes: ECHP(1994-2001) Own calculations. B denotes "Benefit Recipient" and NB "Non-Recipient".

Table 4. Effect of Benefit Receipt on Unemployment and Employment Hazards

	Denmark		France		Germany		Greece	
	COEF.	S.E	COEF.	S.E	COEF.	S.E	COEF.	S.E
Unemployment								
Receiving Benefits	-0.486	0.257	-0.422	0.144	-0.555	0.121	-0.274	0.135
Employment I								
Received Benefits	-1.133	0.333	-1.416	0.183	-1.320	0.189	-0.191	0.142
Log-Likelihood	-1305.02		-1293.51		-1359.04		-1391.79	
Employment II								
Received Benefits	-1.536	0.606	-1.679	0.268	-1.397	0.265	0.005	0.253
Received Benefits* Unem. Duration (1-6)	0.534	0.683	0.450	0.333	0.123	0.303	-0.241	0.259
Log-Likelihood	-1305.02		-1293.51		-1359.04		-1391.79	

	Ireland		Italy		Spain		UK	
	COEF.	S.E	COEF.	S.E	COEF.	S.E	COEF.	S.E
Unemployment								
Receiving Benefits	0.090	0.261	-0.331	0.130	-0.412	0.075	-0.721	0.233
Employment I								
Received Benefits	-0.243	0.432	-0.381	0.147	-0.516	0.088	-2.130	0.361
Log-Likelihood	-1178.24		-1317.83		-1328.68		-1429.03	
Employment II								
Received Benefits	-0.633	0.518	-0.433	0.222	-0.624	0.126	-2.364	0.456
Received Benefits* Unem. Duration (1-6)	0.692	0.551	0.071	0.228	0.165	0.137	0.381	0.454
Log-Likelihood	-1178.24		-1317.83		-1328.68		-1429.03	

Notes: The unemployment and employment hazard functions are estimated jointly, taking the endogeneity of benefits into account and allowing for correlated discrete unobserved heterogeneity. Employment I is the specification which includes the dummy of being a benefit recipient during the previous unemployment spell, while the Employment II specification allows for an interaction with the previous unemployment duration. The coefficient estimates for Unemployment Hazard refer to the Employment I specification. The model is estimated separately for each country including individual characteristics and year dummies for the year entered unemployment and employment, respectively.

Table 5. Duration Dependence and Unobserved Heterogeneity Distibution Estimates

	Denmark		France		Germany		Greece	
	COEF.	S.E.	COEF.	S.E.	COEF.	S.E.	COEF.	S.E.
Duration Dependence								
Unemployment								
Months 6-12	-0.556	0.188	-0.378	0.128	-0.302	0.101	-0.311	0.102
Months 13-24	-1.023	0.233	-0.493	0.133	-0.908	0.121	-1.253	0.158
Months 24+	-2.135	0.362	-1.354	0.203	-2.124	0.179	-2.155	0.245
Employment								
Months 6-12	0.367	0.262	-0.093	0.183	0.774	0.152	0.922	0.107
Months 13-24	-0.428	0.313	-0.897	0.232	-0.010	0.174	-0.808	0.173
Months 24+	-1.443	0.377	-1.541	0.279	-0.626	0.196	-1.521	0.207
Unobs. Heterogeneity								
ε_{u1}	-3.086	0.745	-4.314	0.369	-3.941	0.222	-2.740	0.329
ε_{u2}-ε_{u1}	0.109	0.305	0.120	0.170	-0.054	0.137	0.419	0.125
ε_{e1}	-6.487	1.445	-5.017	0.658	-4.235	0.397	-3.906	0.482
ε_{e2}-ε_{e1}	2.672	0.537	1.821	0.251	1.783	0.225	1.032	0.138
ε_{b1}	0.201	1.334	1.734	0.763	-3.065	0.428	-6.958	1.033
ε_{b2}-ε_{b1}	-inf		-inf		-inf		7.633	0.640
π_1	0.284	0.143	0.327	0.097	0.409	0.073	0.704	0.097
Log-Likelihood (Model 1)	-1305.02		-1293.51		-1359.04		-1391.79	
Log-Likelihood (Model 2)	-1305.02		-1293.50		-1358.72		-1391.79	
Log-Likelihood (Model 3)	-1305.02		-1293.47		-1358.71		-1391.76	

	Ireland		Italy		Spain		UK	
	COEF.	S.E.	COEF.	S.E.	COEF.	S.E.	COEF.	S.E.
Duration Dependence								
Unemployment								
Months 6-12	0.093	0.146	-0.162	0.084	-0.142	0.061	-0.600	0.148
Months 13-24	-0.578	0.190	-1.013	0.118	-0.867	0.085	-0.710	0.158
Months 24+	-1.222	0.287	-1.598	0.154	-1.541	0.123	-2.127	0.245
Employment								
Months 6-12	-0.220	0.282	0.533	0.099	-0.040	0.076	-0.180	0.270
Months 13-24	-0.767	0.303	-1.305	0.175	-1.176	0.107	-0.484	0.276
Months 24+	-0.960	0.316	-1.911	0.205	-1.559	0.124	-1.151	0.306
Unobs. Heterogeneity								
ε_{u1}	-2.924	0.758	-2.804	0.187	-3.053	0.139	-2.319	0.274
ε_{u2}-ε_{u1}	-0.841	0.286	0.791	0.115	0.286	0.079	0.304	0.227
ε_{e1}	-4.864	1.092	-3.689	0.302	-3.853	0.214	-3.998	0.659
ε_{e2}-ε_{e1}	0.527	0.467	0.990	0.137	1.022	0.099	2.495	0.346
ε_{b1}	-0.679	1.849	-inf		-7.583	1.944	-inf	
ε_{b2}-ε_{b1}	7.517	0.562	0.609	0.544	8.967	1.875	3.502	1.007
π_1	0.299	0.124	0.805	0.093	0.502	0.057	0.625	0.099
Log-Likelihood (Model 1)	-1178.24		-1317.83		-1328.68		-1429.03	
Log-Likelihood (Model 2)	-1178.21		-1317.79		-1328.66		-1429.03	
Log-Likelihood (Model 3)	-1178.17		-1317.80		-1328.63		-1429.03	

Notes: The estimates refer to the specification Employment I for the employment hazard of Table 4 with two mass points for each equation and restricted correlation across the three equations (Model 1). The log-likelihood of Model 2 refers to the estimated model with two mass points in which the restriction in the correlation of the error terms is relaxed. The log-likelihood of Model 3 allows for 3 mass points.

Table 6. Simulation of Survival in Unemployment and Employment for a Reference Individual by Benefits Status

	Denmark			France			Germany			Greece		
	Surv.	S.E	*t*	Surv.	S.E	*t*	Surv.	S.E	*t*	Surv.	S.E	*t*
Survival in Unemployment after 6 months												
Recipients	0.504	0.119	4.24	0.421	0.078	5.36	0.543	0.071	7.66	0.430	0.066	6.56
Non-Recipients	0.347	0.095	3.65	0.282	0.062	4.53	0.362	0.057	6.36	0.338	0.048	7.11
Difference (U6)	*0.156*	*0.152*	*1.03*	*0.138*	*0.100*	*1.38*	*0.181*	*0.090*	*2.01*	*0.091*	*0.080*	*1.14*
Survival in Unemployment after 12 months												
Recipients	0.344	0.125	2.77	0.234	0.073	3.21	0.347	0.078	4.45	0.232	0.061	3.81
Non-Recipients	0.191	0.084	2.28	0.118	0.045	2.64	0.170	0.048	3.55	0.152	0.037	4.05
Difference (U12)	*0.153*	*0.149*	*1.03*	*0.115*	*0.085*	*1.35*	*0.176*	*0.091*	*1.93*	*0.080*	*0.071*	*1.13*
Survival in Employment after 6 months												
Recipients	0.885	0.076	11.60	0.904	0.039	23.47	0.935	0.026	35.89	0.791	0.046	17.30
Non-Recipients	0.717	0.131	5.46	0.681	0.090	7.56	0.788	0.060	13.22	0.756	0.042	17.84
Difference (E6)	*0.168*	*0.151*	*1.11*	*0.223*	*0.097*	*2.30*	*0.146*	*0.065*	*2.25*	*0.035*	*0.062*	*0.56*
Survival in Employment after 12 months												
Recipients	0.751	0.139	5.42	0.825	0.065	12.64	0.811	0.064	12.70	0.456	0.083	5.49
Non-Recipients	0.470	0.179	2.63	0.484	0.117	4.14	0.487	0.100	4.89	0.392	0.068	5.77
Difference (E12)	*0.281*	*0.226*	*1.24*	*0.340*	*0.133*	*2.56*	*0.323*	*0.118*	*2.74*	*0.063*	*0.107*	*0.59*
	Ireland			Italy			Spain			UK		
	Surv.	S.E	*t*	Surv.	S.E	*t*	Surv.	S.E	*t*	Surv.	S.E	*t*
Survival in Unemployment after 6 months												
Recipients	0.385	0.120	3.20	0.531	0.060	8.85	0.492	0.041	11.98	0.455	0.102	4.46
Non-Recipients	0.413	0.088	4.68	0.425	0.046	9.20	0.354	0.034	10.38	0.320	0.073	4.40
Difference (U6)	*-0.028*	*0.149*	*-0.19*	*0.106*	*0.075*	*1.41*	*0.137*	*0.053*	*2.58*	*0.134*	*0.125*	*1.07*
Survival in Unemployment after 12 months												
Recipients	0.151	0.093	1.62	0.311	0.064	4.88	0.266	0.041	6.52	0.261	0.098	2.66
Non-Recipients	0.166	0.073	2.28	0.205	0.041	5.01	0.143	0.026	5.57	0.141	0.055	2.54
Difference (U12)	*-0.014*	*0.118*	*-0.12*	*0.106*	*0.075*	*1.41*	*0.122*	*0.048*	*2.54*	*0.120*	*0.112*	*1.07*
Survival in Employment after 6 months												
Recipients	0.772	0.351	2.20	0.872	0.032	27.14	0.837	0.026	32.45	0.951	0.030	31.18
Non-Recipients	0.759	0.358	2.12	0.821	0.034	23.83	0.746	0.032	23.26	0.709	0.101	7.01
Difference (E6)	*0.013*	*0.500*	*0.03*	*0.050*	*0.047*	*1.06*	*0.090*	*0.041*	*2.20*	*0.241*	*0.105*	*2.30*
Survival in Employment after 12 months												
Recipients	0.725	0.377	1.92	0.694	0.065	10.68	0.705	0.042	16.88	0.916	0.048	18.96
Non-Recipients	0.711	0.383	1.86	0.592	0.062	9.53	0.563	0.046	12.12	0.554	0.130	4.25
Difference (E12)	*0.014*	*0.537*	*0.03*	*0.101*	*0.089*	*1.13*	*0.142*	*0.062*	*2.29*	*0.362*	*0.138*	*2.62*

Notes: The survival rates are computed for a reference individual who is 25-29 years old with secondary education, married to a non-employed spouse, while the regional unemployment rate at the entry year into each state is kept at its mean value. For the survival in employment, a distinction is made between previously unemployed recipients and non-recipients with unemployment duration between 1-6 months who are now in a full time job. The survival function is computed for the reference individual for each point of the discrete heterogeneity distribution and then weighted using the probability estimates for each point. Duration dependence is also taken into account. Standard errors are calculated by simulation from the estimated asymptotic distribution of the parameters.

Table B.1. Unemployment Benefits in Selected European Countries.

	Schemes	Employment/contributions conditions	Payment rate	Duration (months)
Denmark	Insurance	52 weeks in 3 years	90% of reference earnings	1+3 years
France	Insurance	4 months in last 18 months	40% to 57% decreasing at 4 monthly intervals	4-60 months depending on age
Germany	Insurance	12 months in 3 years	60% of net earnings for singles and 67% with children	12-64 months depending on age and contribution history
	Assistance	Received UI during last year or being in need	53% of net earnings for single and 57% with children	Unlimited - renewable every year
Greece	Insurance	125 days during 14 months, or 200 days during 2 years	40% of daily wage for manual and 50% for white collar	5-12 months depending on contribution history
Ireland	Insurance	39 weeks in 1 year	Flat rate (98 Euros per week)	390 days
	Assistance	Means tested	Flat rate (97-98 Euros per week)	Unlimited
Italy	Ordinary	52 weeks in 2 years	30% of average wage in last 3 months	180 days
	Special	43 weeks in 2 years in building industry	80% of earnings	90 days
	Mobility	12 months with at least 6 months of effective work in a firm	80% of earnings supplement	36 months
Spain	Insurance	12 months in 6 years	70% of earnings in first 180 days and 60% afterwards	4-24 months depending on contribution history
UK	Insurance	Contributions paid in one of the 2 tax years on which the claim is based amounting to at least 25 times the minimun contribution for that year	Flat rate (65-83 Euros per week) depending on age	182 days
	Assistance	Means Tested	Flat rate (99-130 Euros per week) depending on age	Unlimited

Source: European Commission, MISSOC (1994).

Table C.1. Hazard Estimates for Individual Characteristics

	Denmark		France		Germany		Greece	
	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.
Unemployment								
High Educ.	-0.211	0.189	0.120	0.159	0.517	0.141	-0.019	0.120
Secondary Educ.	-0.019	0.161	0.383	0.110	0.363	0.102	-0.086	0.091
Age 20-24	0.233	0.301	1.986	0.265	1.332	0.190	0.302	0.185
Age 25-29	0.760	0.262	2.002	0.249	1.407	0.174	0.475	0.163
Age 30-39	0.883	0.226	1.701	0.241	1.377	0.153	0.566	0.153
Age 40-49	0.715	0.250	1.500	0.240	1.052	0.146	0.280	0.143
Married	0.048	0.176	0.167	0.135	0.207	0.106	0.253	0.143
Number of Kids	0.054	0.083	0.049	0.052	0.053	0.044	0.090	0.056
Spouse Non-Emp.	-0.387	0.168	0.142	0.124	-0.198	0.098	0.114	0.109
Regional Un. Rate	0.069	0.059	0.004	0.018	0.022	0.011	0.008	0.021
Employment I								
Un. Dur. (1-6 M)	0.726	0.447	-0.113	0.221	-0.008	0.176	0.276	0.191
Un. Dur. (7-12 M)	0.887	0.490	-0.279	0.263	-0.070	0.204	-0.022	0.220
High Educ.	-0.198	0.329	-0.382	0.295	-0.639	0.224	-0.332	0.162
Secondary Educ.	-0.187	0.262	-0.199	0.168	-0.250	0.153	-0.127	0.113
Age 20-24	-0.077	0.540	1.206	0.488	-0.791	0.272	0.310	0.233
Age 25-29	-0.316	0.411	0.753	0.476	-0.726	0.236	0.107	0.199
Age 30-39	-0.715	0.373	0.650	0.469	-0.811	0.201	0.167	0.183
Age 40-49	-0.749	0.414	0.599	0.475	-0.472	0.201	0.275	0.169
Married	-0.310	0.312	-0.298	0.208	-0.204	0.164	-0.036	0.172
Number of Kids	-0.024	0.149	0.030	0.091	-0.029	0.064	-0.032	0.067
Spouse Non-Emp.	0.127	0.296	0.078	0.219	0.174	0.152	0.239	0.134
Part-Time Job	-0.763	0.618	0.416	0.227	0.593	0.261	0.142	0.139
Regional Un. Rate	0.098	0.114	0.033	0.028	0.038	0.017	-0.010	0.031
Benefit Equation								
High Educ.	0.563	0.546	-0.067	0.354	-0.166	0.279	-0.666	0.291
Secondary Educ.	-0.203	0.408	0.042	0.224	-0.179	0.218	-0.446	0.216
Age	-0.012	0.018	0.027	0.013	0.271	0.010	-0.005	0.013
Married	0.344	0.445	0.144	0.279	-0.319	0.279	0.583	0.381
Number of Kids	0.250	0.255	-0.148	0.106	-0.259	0.107	0.160	0.138
Spouse Non-Emp.	-0.015	0.375	0.129	0.269	-0.061	0.199	-0.101	0.299
Regional Un. Rate	0.343	0.093	0.021	0.041	-0.045	0.023	0.112	0.048
Months 6-12	2.650	1.025	2.495	0.514	3.182	0.466	2.535	0.591
Months 13-24	2.571	1.033	2.564	0.516	1.538	0.219	1.890	0.467
Months 24+	0.334	0.490	1.281	0.341	0.904	0.205	2.299	1.028

(continues)

Table C.1. Hazard Estimates for Individual Characteristics (cont.)

	Ireland		Italy		Spain		UK	
Unemployment								
High Educ.	0.216	0.245	0.466	0.189	0.074	0.085	0.304	0.122
Secondary Educ.	0.300	0.133	0.202	0.080	-0.052	0.067	0.050	0.159
Age 20-24	0.554	0.254	0.405	0.170	0.800	0.111	0.646	0.214
Age 25-29	0.594	0.258	0.371	0.157	0.789	0.106	0.554	0.211
Age 30-39	0.433	0.209	0.377	0.134	0.707	0.095	0.346	0.204
Age 40-49	0.304	0.201	0.319	0.137	0.573	0.099	0.211	0.194
Married	0.357	0.215	0.454	0.129	0.172	0.082	0.184	0.143
Number of Kids	0.008	0.054	0.047	0.045	-0.012	0.028	-0.072	0.055
Spouse Non-Emp.	-0.167	0.181	-0.069	0.100	0.118	0.075	-0.357	0.141
Regional Un. Rate	0.030	0.052	-0.018	0.004	0.003	0.004	-0.027	0.022
Employment I								
Un. Dur. (1-6 M)	0.071	0.338	0.359	0.155	0.288	0.108	-0.365	0.278
Un. Dur. (7-12 M)	0.538	0.344	0.405	0.170	0.364	0.118	-0.547	0.373
High Educ.	0.169	0.465	-0.109	0.247	-0.236	0.120	-0.620	0.245
Secondary Educ.	-0.268	0.246	-0.068	0.109	-0.121	0.091	-0.527	0.298
Age 20-24	-0.260	0.486	-0.566	0.240	-0.436	0.145	-0.078	0.399
Age 25-29	-0.178	0.467	-0.367	0.210	-0.404	0.135	0.425	0.386
Age 30-39	0.062	0.356	-0.193	0.168	-0.445	0.120	-0.255	0.396
Age 40-49	0.306	0.337	-0.212	0.169	-0.196	0.121	-0.334	0.397
Married	-0.112	0.334	-0.162	0.174	-0.398	0.113	-0.861	0.279
Number of Kids	0.115	0.099	-0.012	0.064	0.069	0.040	0.106	0.110
Spouse Non-Emp.	-0.337	0.301	-0.142	0.130	0.055	0.100	0.242	0.269
Part-Time Job	0.792	0.250	0.101	0.144	0.532	0.113	0.203	0.278
Regional Un. Rate	0.019	0.079	0.029	0.005	0.039	0.006	0.014	0.040
Benefit Equation								
High Educ.	0.836	0.725	0.103	0.454	0.202	0.190	0.058	0.366
Secondary Educ.	-0.587	0.367	0.007	0.231	-0.155	0.144	-0.356	0.461
Age	-0.016	0.021	0.022	0.015	0.013	0.006	-0.023	0.017
Married	-1.084	0.656	0.967	0.406	0.553	0.168	0.169	0.381
Number of Kids	0.887	0.175	0.111	0.128	0.016	0.066	-0.008	0.158
Spouse Non-Emp.	1.063	0.642	-0.738	0.282	0.202	0.158	0.113	0.376
Regional Un. Rate	-0.157	0.134	0.013	0.010	0.007	0.010	0.039	0.062
Months 6-12	.	.	2.679	0.589	2.985	0.340	0.544	0.416
Months 13-24	0.513	0.563	1.536	0.403	1.778	0.220	1.095	0.554
Months 24+	0.521	0.646	3.006	1.020	1.301	0.230	-0.303	0.471

Notes: The estimates for the observed individual characteristics for the unemployment and employment hazard refer to Table 4. For the employment hazard the specification Employment I is considered.

Table C.2. Benefit Estimates with Exits to Inactivity Treated as Censored Unemployment Spells

	Denmark		France		Germany		Greece	
	COEF.	S.E	COEF.	S.E	COEF.	S.E	COEF.	S.E
Unemployment								
Receiving Benefits	-0.561	0.278	-0.422	0.144	-0.407	0.137	-0.242	0.136
Employment I								
Received Benefits	-1.110	0.336	-1.476	0.185	-1.449	0.167	-0.181	0.142
Log-Likelihood	-1232.08		-1293.50		-1250.60		-1350.26	

	Ireland		Italy		Spain		UK	
	COEF.	S.E	COEF.	S.E	COEF.	S.E	COEF.	S.E
Unemployment								
Receiving Benefits	0.201	0.254	-0.350	0.135	-0.406	0.076	-0.411	0.263
Employment I								
Received Benefits	-0.487	0.497	-0.357	0.153	-0.489	0.089	-2.104	0.375
Log-Likelihood	-1121.91		-1267.44		-1267.98		-1256.66	

Notes: These estimates are based on the flow sample of the unemployed, treating those who exit to inactivity as right censored.

Table C.3. Effect of Benefit Receipt on Unemployment and Employment Hazards by Level of Education

	Denmark		France		Germany		Greece	
	COEF.	S.E	COEF.	S.E	COEF.	S.E	COEF.	S.E
Unemployment								
Reveiving Benefits (RB)	-0.450	0.358	-0.347	0.197	-0.478	0.188	-0.287	0.165
RB * High Education	-0.399	0.419	-0.183	0.312	-0.427	0.270	0.082	0.275
RB * Medium Education	0.032	0.346	-0.105	0.221	-0.025	0.200	0.005	0.197
Employment								
Reveiving Benefits (RB)	-0.594	0.519	-1.412	0.271	-1.557	0.287	-0.282	0.176
RB * High Education	-2.085	0.824	-0.476	0.571	0.377	0.453	-0.230	0.332
RB * Medium Education	-0.634	0.668	0.072	0.347	0.309	0.298	0.312	0.225
Log-Likelihood	-1305.01		-1293.51		-1359.04		-1391.79	

	Ireland		Italy		Spain		UK	
	COEF.	S.E	COEF.	S.E	COEF.	S.E	COEF.	S.E
Unemployment								
Reveiving Benefits (RB)	0.068	0.287	-0.383	0.143	-0.446	0.080	-0.580	0.259
RB * High Education	0.178	0.487	0.095	0.445	-0.027	0.167	-0.404	0.257
RB * Medium Education	0.029	0.284	0.175	0.192	0.227	0.134	0.042	0.343
Employment								
Reveiving Benefits (RB)	-0.301	0.465	-0.487	0.162	-0.429	0.095	-1.870	0.411
RB * High Education	1.645	1.199	0.896	0.511	-0.432	0.236	-0.256	0.502
RB * Medium Education	0.055	0.556	0.251	0.232	-0.360	0.181	-1.412	0.817
Log-Likelihood	-1178.24		-1317.83		-1328.67		-1429.03	

Notes: The benefit indicators are interacted with the indicators of high and medium education. The unemployment and employment hazard functions are estimated jointly taking into account the endogeneity of benefits and allowing for correlated discrete unobserved heterogeneity. The model is estimated separately for each country including individual characteristics and year dummies for the year entering in unemployment and employment, respectively.