The Effect of Unemployment Insurance on Unemployment Duration and Subsequent Employment Stability

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Abstract

This paper studies the effect of Unemployment Insurance (UI) on post-unemployment employment stability using individual data from the European Community Household Panel for ten countries. Estimating a multivariate hazard model which controls for correlated unobserved heterogeneity it is found that receipt of benefits significantly reduces not only the exit rate from unemployment but also the exit rate from subsequent employment. Recipients remain employed on average 4 months more than non-recipients, which represents a 20% increase relative to the average employment duration. These results are in line with the hypothesis that UI improves post-unemployment outcomes by allowing more efficient search.

Keywords: Unemployment Insurance; Unemployment Duration, Employment Stability, Duration Analysis, Unobserved Heterogeneity

JEL Classification: J64; J65; C41

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1 Introduction

The effect of Unemployment Insurance (UI) on labor market dynamics and in particular on the transition out of unemployment has attracted much attention in the last 30 years (see Atkinson and Micklewright (1991); Devine and Kiefer (1991) for reviews). Surprisingly enough, there are only few studies which investigate the effect of UI on post-unemployment outcomes. Ehrenberg and Oaxaca (1976) are the first to consider the effect of UI on re-empoyment wages, while Belzil (2001) has focused on the effect of UI on reemployment duration.[1] This paper contributes to the scarce literature on post-unemployment effects of UI by investigating the effect of UI benefits on unemployment duration and subsequent employment stability for a number of European countries. The motivation for focusing on employment stability is twofold. First, UI may affect the duration of subsequent employment, that is, the time until a reemployed worker will experience unemployment again. This may justified by the standard partial theory of job search in which a possible beneficial effect of UI can arise when UI benefits are seen as a "search subsidy" (Burdett, 1979) increasing reservation wages and subsequent job matching. In the macro literature, Marimon and Zilibotti (1999) show in an equilibrium search-matching model that UI has the standard effect of reducing employment but also helps workers to get a suitable job. This emerges as UI allows the unemployed to select employment offers which are compatible with their skills and therefore less likely to dissolve. Therefore, considering the effect of UI separately on unemployment and employment duration addresses the matching hypothesis which states that if benefits give time to the unemployed to obtain a better match then this should imply a positive correlation between unemployment and subsequent employment duration for the recipients. Second, estimating separately the effect of benefits on unemployment and employment durations is necessary in order to evaluate the long run consequences of UI.

Specifying a tractable structural model in which the effect of a change in UI

[1] There are also other studies which focus on both unemployment and employment durations. Van den Berg and Ridder (1998) estimate an equilibrium search model in which the the wage offer distribution is endogenous finding that search frictions can explain about 20% of the variation in observable wage offers. Other studies in the policy evaluation literature investigate the effect of training on unemployment and subsequent employment duration using individual transition data e.g. Gritz (1993), Ham and LaLonde (1996), Bonnal et.al. (1997), van Ours (2001).

on match quality is derived from the full response of individuals and firms requires a number of assumptions and parameters, which have not been estimated to date. Alternatively, we adopt a reduced-form approach by estimating multivariate mixed proportional hazard models. In particular, we identify the effect of UI benefits on unemployment duration by comparing the exit rate of unemployed with and without benefits given unemployment duration and controlling for other individual characteristics. The identification of the effect of UI benefits on employment duration is obtained by comparing the effect of previous unemployment duration between recipients and non-recipients. Considering not only the unemployment but also the subsequent employment spells, we extend the model by Bover, Arellano and Bentolila (2002) on the effect of UI benefits on unemployment duration in Spain.[2]

The empirical analysis in this paper employs the European Community Household Panel (ECHP, 1994-2001) for ten countries (Belgium, Denmark, France, Germany, Greece, Italy, Ireland, Portugal, Spain, and the UK). The ECHP is a survey based on a standardized questionnaire that involves annual interviewing of a representative panel of households and individuals in each EU country. Two features make the ECHP attractive for this study and characterize the main advantages of using survey data instead of administrative data. First, the ECHP allows to construct labor market histories of individuals on a monthly basis using the calendar of activities, which is self-reported information for the labor market status in each month during the previous year. That is, it is possible to identify unemployment spells that end into employment and follow these employment spells thereafter. In contrast, with most administrative data we would only be able to model the probability of leaving unemployment, and not the job finding rate, as the exact destination state after leaving unemployment is not observed. Consequently, we would have no information for the subsequent employment. Second, the ECHP provides a representative random sample containing both benefit recipients and non-recipients. This variation on benefit receipt is mainly due to eligibility criteria for receiving UI based on previous employ-

[2] An alternative identification strategy which is usually followed in the US studies is to exploit the variation across time and across states of the unemployment insurance system. However, given the small number of countries and the limited variation across time identification would be problematic.

ment and contributions.[3] The growth of fixed term contracts in most EU countries in the recent years has also contributed in an exogenous way to this variation as individuals in fixed contracts may not fulfill the eligibility criteria for benefit receipt at the time their contract expires.

However, the main drawback of using survey data is on the size of the sample and the quality of the data regarding the main features of the UI system, that is, the amount of benefits and the duration. In particular, we only observe the amount of benefits on a yearly basis, while benefit duration is only observed if an individual exhausts benefits before exiting unemployment. Due to these limitations, the analysis relies on the indicator of receiving benefits during each unemployment spell.[4] For the reasons outlined above, our analysis differs from previous studies based on administrative data which identify the effect of UI through variation on the amount or duration of benefits for the eligible recipients.

A number of econometric issues should be noted. The first refers to the endogeneity of benefits. As mentioned above, benefit duration is not observed so that we can only condition the hazard out of unemployment on benefits up to the present time and not on the entire path. Therefore, we treat benefits as a predetermined variable since knowledge of benefit receipt at future durations might have an effect on the current exit rate. As noted by Bover et. al. (2002), the presence of unobserved heterogeneity has the effect of rendering the predetermined benefits an endogenous variable. Moreover, as benefits are not randomly assigned across unemployed, the absence of benefits might be correlated with unobserved characteristics, e.g. characteristics that make the individual less employable, which would bias downwards the effect of benefits on the exit rate from unemployment. To account for endogeneity of benefits, we specify a reduced form process for benefits allowing unobserved heterogeneity to be correlated with benefits.

The second issue refers to the endogeneity of previous unemployment duration

[3] The following section provides a brief description of the characteristics of Unemployment Benefit system in the ten European countries analyzed in the study.

[4] Due to data limitations, the Netherlands, Austria, Finland, and Sweden are not included in the analysis. For the Netherlands and Sweden the information for the calendar of labor market activities is not available, while for Austria and Finland, accession in the EU in 1995 leads to a small number of available spells.

on subsequent employment duration. Any such correlation may be spurious if unobserved characteristics, such as ability or motivation, are associated with longer unemployment spells and unstable employment relations. To disentangle the true effect of previous unemployment from spurious correlation, we allow unobserved heterogeneity to be correlated between unemployment and employment spells. We then estimate the joint model of unemployment and employment transitions by maximum likelihood taking into account the endogeneity of benefits and correlated unobserved heterogeneity across the two durations. Identification of duration dependence and unobserved heterogeneity in the mixed proportional hazard model with multiple spells has been shown by Honore (1993).

Confirming previous studies in the literature we find that receiving benefits significantly reduces the hazard rate out of unemployment, which leads to longer unemployment spells for the recipients compared to non-recipients. Regarding the effect of benefits on - post-unemployment - employment stability, we find a negative effect of receiving benefits during unemployment on the exit rate from subsequent employment spells. This effect is significant in all countries except Greece, Ireland, and Portugal. In these countries the welfare state was developed more recently and can be characterized as less generous. In particular, we find that benefit recipients have longer employment spells of about 4 months compared to non-recipients, which represents a 20% increase relative to the average employment duration. These results support the matching hypothesis according to which benefits allow workers to search longer and select employment offers which are better matches without being forced to accept the first available offer as is the case for the non-recipients. The findings are robust to selection on benefits and spurious correlation between unemployment and employment duration due to unobserved heterogeneity. Therefore, our results provide support for the beneficial role of UI on improving employment stability, an issue which has been mostly neglected in the empirical literature of the effect of UI.

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

in Section 6. The conclusions of the study are drawn in the last section.

2 Institutional Characteristics of UI in Europe

The aim of this section is to provide a brief description of the main features of the Unemployment Insurance system. Table A1 in the Appendix shows the main characteristics of the system for the ten countries analyzed in this study. There are mainly two schemes of unemployment benefits, that is, unemployment insurance, and unemployment assistance. Unemployment insurance is the main scheme under which those who are eligible receive compensation in the event of entry into unemployment. Eligibility is based upon previous employment and contribution histories, so does not cover all the unemployed. Unemployment assistance is not available in all countries. It is generally means tested and it is usually available for those who exhaust unemployment insurance and those who are not eligible.[5] Following Bertola et.al., countries can be classified as follows: 1) the Nordic countries, such as Denmark in our study, which provide generous unemployment benefits, 2) the Continental countries, such as Belgium, France, and Germany, which also provide generous benefits, 3) the Anglo-Saxon countries, such as the United Kingdom, and Ireland, which have relatively low unemployment insurance benefits, and 4) the southern European countries, such as Greece, Italy, Portugal, and Spain, which have welfare states that were developed recently and provide limited unemployment insurance.

3 Theoretical Arguments and Empirical Evidence

The theoretical analysis for the effect of UI benefits (UIB) on the escape rate out of unemployment predicts that higher benefits and longer benefit duration lead to longer unemployment spells. The standard framework of analysis is based on models of job search (e.g., Mortensen, 1977; Devine and Kiefer, 1991; Lippman and McCall, 1976). In these models, the representative worker is assumed to choose the optimal search strategy in order to maximize the present value of her lifetime utility which

[5] In what follows we do not distinguish between unemployment insurance and assistance.

depends on income and leisure. Offers drawn from a stationary distribution arrive randomly one at each point in time and the worker has to choose sequentially whether to accept the current offer or to continue searching. The optimal strategy consists of the reservation wage and the optimal search effort. The reservation wage is such that the expected gain from rejecting an offer and continue searching is equal to the value of accepting the current wage offer. The search intensity is determined by the equality of the marginal cost and the marginal benefit of search. The exit rate from unemployment is defined as the product of the probability of receiving an offer times the probability of accepting it. The exit rate increases with search intensity because the arrival rate of job offers increases. The exit rate also rise as the reservation wage declines since the probability of an offer being accepted increases.

Under this framework, benefit recipients choose higher reservation wages and devote less search effort since the opportunity cost of search is lower. This leads to a drop in the exit rate from unemployment for recipients. Further results have shown that close to benefits exhaustion the unemployment exit rate increases (Mortensen, 1977; Meyer, 1990). The reason is that close to benefit termination the value of being unemployed drops, so the marginal benefit of search increases and the reservation wage falls leading to a higher exit rate.

This disincentive effect of the UIB system has been the conventional wisdom in modern labor economics. However, UI benefits can have an effect not only on the unemployment duration but also on the post-unemployment outcomes. There are two channels through which the effect of benefits on the subsequent employment has been illustrated.

The first, which has been discussed more in the literature, focuses on the effect of UI on the post-unemployment wages. As long as benefits lead to higher reservation wages, this should be reflected on the wages offered by the subsequent job. Ehrenberg and Oaxaca (1976), who were the first to consider the effect of UI on postunemployment outcomes, found a positive effect of benefits on post-unemployment wages. More recently, Addison and Blackburn (2000) review the literature and provide results which suggest a weak effect.

The second channel, suggests that benefits can also have an effect on the subse-

quent employment duration by allowing the unemployed to accept job offers which are compatible with their skills and therefore less likely to dissolve. Following Burdett (1979), unemployment benefits provide a "search subsidy" for giving the unemployed the time to find not just a job, but the "right job". In particular, unemployed without benefits might accept unsuitable jobs. On the other hand, generous benefits can make the unemployed very selective and reject matches which would have been socially efficient.Marimon and Zilibotti (1999) developed an equilibrium search-matching model in which UIB has the standard effect of reducing employment, but also helps workers to get a suitable job.

Other theoretical arguments based on the implicit contract literature suggest that UIB can affect employment duration by inducing layoffs. The future entitlement of benefits makes an optimal response of a firm, which faces demand fluctuations and firm specific human capital, to lay off workers with high level of UI entitlement and recall them back close to benefits exhaustion (Feldstein, 1976).

The empirical literature on the effect of UI on re-employment duration is rather limited mainly due to the scarcity of large micro data sets which provide information both on labor market histories and on UI benefits and has focused on Canadian and US data. Belzil (2001), studies the effect of the UI benefits on the exit rate from unemployment and subsequent employment using an inflow sample of unemployed from administrative files of the Canadian unemployment insurance program. He distinguishes between the "Matching" hypothesis and the "Adverse Selection" hypothesis. The first suggests that there is a positive correlation between the unemployment duration and subsequent job duration for benefit recipients, while the second refers to a spurious correlation between unemployment and subsequent job duration due to unobserved heterogeneity. His findings suggest that both hypotheses contribute to explain the observed correlation between unemployment duration and subsequent job duration. However, the effect of UI benefits is rather weak. In particular, he reports that increasing the maximum benefit duration by one week would raise expected unemployment duration by 1.0 to 1.5 days, but raise expected job duration by only 0.5 to 0.8 days.

Baker and Rea (1998), examine whether the requirements that workers must sat-

isfy to become eligible for benefits in the future affect employment duration. Employing Canadian data, they find a significant increase in the employment hazard in the week that an individual satisfies the eligibility requirement in many regions of the country. Jurajda (2002) looks also at the effect of future entitlement to UI benefits on the probability to exit employment using US data on labor market histories of displaced workers. Estimating a competing risk duration model he finds that being entitled to UI benefits significantly increases the layoff hazard. However, neither the length of potential UI entitlement, nor the benefit level affects the layoff hazard. Finally, the quit hazard is not affected by any of the UI system parameters.

4 Data Description

The analysis is based on individual data from the European Community Household Panel (ECHP, 1994-2001). The ECHP is a survey based on a standardized questionnaire that involves annual interviewing of a representative panel of households and individuals 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 nationally represented 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 for this study. That is, 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 Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Portugal, Spain, and the UK. We exclude the Netherlands and Sweden as the information from the calendar of activities is not reported, as well as, Austria and Finland, as they entered the panel after accession to the EU in 1995 which leaves only few years of available data for this analysis.

Using the calendar of activities for the years 1994-2001, which provides monthly information about the labor market status in the previous year, we construct individ-

ual labor market histories up to December 2000.[6] The sample consists of an inflow of male individuals in unemployment out of employment after the date of interview in year 1994. That is all sampled unemployed are exiting an ongoing employment spell at the first month of the year in which they were first interviewed. The analysis is focused on males aged 20-60 years old. We concentrate on males because of their higher attachment to the labor market and we allow for multiple spells of unemployment and subsequent employment.

Unemployment spells can end in one of the following two ways: by re-entering employment, or by exiting 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 complete spells, while transitions from unemployment out of the labor force are considered as continued unemployment spells. Those unemployed who exit the labor force can either become employed, re-enter unemployment, or remain out of the labor force. 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.

Transitions in the sample are depicted in Table (1) with the first column showing the number of unemployment spells observed for each country. Between 63 percent (for Germany) and 78 percent (for UK) of these unemployment spells end into employment, while we observe between 20 to 25 percent of these subsequent employment spells to exit back to unemployment. For Italy, Spain, and Greece, the percentage of employment spells which end into unemployment are 40, 42, and 49 percent, respectively. These are also countries with unemployment rate above the European average.

4.1 Description of Data on Unemployment Insurance

4.1.1 Benefit Indicator

The empirical analysis is based on a comparison between benefit recipients and non-recipients. This is similar to the study by Bover et.al. (2002) who investigate the

[6] The calendar of activities refers to the labor market status during the previous calendar year so the last observed year is 2000.

effect of benefits on unemployment duration in Spain, but contrary to many other studies who identify the effect of benefits by using variation on the amount and duration of benefits. The reason for following this strategy is that information on unemployment benefits in the ECHP is rather limited and is based on two main sources. The first refers to the question on whether an unemployed receives benefits at the time of the interview. The second refers to the amount of benefits received during the year. However, this amount can only be used to infer receipt of benefits when the first measure is not available, but cannot be used as a benefit level for a particular unemployment spell. So, we need to combine both these sources to determine whether an unemployed receives benefits during a spell. This is particularly relevant for short spells. 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 (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 vs. non recipients for spells like A or B in Figure (1). 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.

The need to rely on the information for the amount of benefits received during a year to identify benefits receipt creates some difficulties in the case an individual experiences two unemployment spell 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 infor-

mation 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 it reaches the following year (Spell B), then the amount of benefits received in the following year is used to infer whether the unemployed received benefits during this spell. Inference for spells of type A is not possible when another spell P exists and the unemployed received benefits during that year. Another type of spells for which we cannot infer the benefits status is spells followed by another spell in the same year. This is shown in Figure (1) as a combination of spells B and B1. If the individual receives benefits in both years then 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, 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 benefits eligibility criteria based on employment requirements, 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.[7]

4.1.2 Benefit Duration

As mentioned above, the ECHP does not contain any information on benefit duration. Following Bover et.al. (2002), we construct a measure of benefits duration using the two sources of information on benefits used so far and the unemployment duration. This constructed benefit duration variable coincides with the unemployment duration for those who have not exhausted their benefits before leaving unemployment. That

[7] An alternative is to drop these spells which of course creates some selection bias since they tend to be spells with short unemployment duration. This alternative has been pursued correcting for the selection bias by giving additional weight to the spells in the sample with unemployment duration equal to the duration of the spells dropped without altering the results.

is, the duration of benefits is censored although this censoring is of a different kind compared to the censoring of the unemployment duration. Combining the information on the receipt of benefits with the amount of benefits we can identify those who have exhausted their benefits.

To see this, consider the spell of type C in Figure (1). If the unemployed does not receive benefits at the time of the next interview but has received benefits during the year in which entered unemployment, then is considered as a benefit recipient who has exhausted benefits at the end of 1994. Similarly, if an unemployed with a spell of type B receives benefits in 1994, but not in 1995, then is considered as if the 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 benefits exhaustion. That is, if an unemployed receives benefits at the interview in wave 2, but does not receive any more benefits at the interview in wave 3, it is assumed given that is still unemployed that has exhausted the benefits at the end of 1995. Finally, for short spells of type A the benefit duration coincides with the unemployment duration. Therefore, the data are asymmetric in the two durations and a monthly benefit indicator variable $I(t_b \geq t_u)$ is constructed, which is equal to 1 if $t_b \geq t_u$, that is, if unemployed still receive benefits, where t_b refers to the duration of benefits and t_u to the duration of unemployment.

4.2 Descriptive Statistics

Since we are relying on non-experimental data, it is expected that benefit recipients are not a random group of unemployed. Table 2 shows summary statistics of unemployment spells in the sample. The first column for each country refers to spells with unemployment benefits, while the second to those without benefits. We observe that there is variation across countries on the number of spells with benefits which reflects the different eligibility criteria that apply to each country. It is the feature of our data that provides this variation in the receipt of benefits since we are drawing an inflow sample into unemployment from a representative survey of the population. It is usually in administrative data the case in which non-recipients is a minority with certain characteristics, such as seasonal workers. Nevertheless, it is expected that

receipt of benefits is associated with certain individual characteristics. In particular, benefit recipients tend to be less educated, older, more likely to be married with more kids and spouses who are non-employed. Apart from this observed heterogeneity recipients might differ with non-recipients with respect to other characteristics which are unobservable. The way to address this bias in the data will be discussed in the next section which describes the statistical model.

4.2.1 Kaplan-Meier Survivor Functions

We begin our analysis of the effect of UI by examining the Kaplan-Meier survivor functions for recipients' and non-recipients' unemployment and employment spells in Table 3a and Table 3b, respectively. Starting with the unemployment spells, Table 3a indicates that the percentage of recipient's unemployment spells which lasted for more than 12 months is higher compared to non-recipients. For instance, 47 percent of recipient's unemployment spells in France lasted for more than 12 months compared to 33 percent of non-recipients. The survival rate after 12 months for recipients vs. non-recipients for Germany is 49 percent vs. 27 percent, for Ireland 35 percent vs. 20 percent, for Portugal 67 percent vs. 27 percent, for Spain 31 percent vs. 22 percent, and for the UK is 42 percent vs. 26 percent. It is only for Greece and Italy that we observe the percentage of those surviving after 12 months to be lower for recipients compared to non-recipients.

Similarly, Table 3b depicts the survival rate for employment spells stratified by receiving benefits during the previous unemployment spell. Panel A which refers to all previous unemployment spells indicates that after 12 months in employment the percentage of those who survived is higher for previously unemployed recipients in Belgium, France, Germany, Portugal, and the UK. Panel B, focuses on those employed who have found a job after being unemployed for more than 6 months. For this group, we observe that, except for Greece, Italy, and Spain, the percentage of employment spells which survive after 12 months is higher for those who received benefits during their unemployment spell compared to those who had no benefits. Thus, benefits receipt seems to be a mixed blessing as it increases the length of both unemployment and employment spells.

However, as previously noted, such analysis of recipients' and non-recipients' employment histories may be misleading. First, the sample of recipients and non-recipients is not randomly drawn so that a simple comparison between their survival rates may be confounded by individual characteristics associated with receipt of benefits. Moreover, the subsamples of recipients and non-recipients who experience an employment spell are also not randomly drawn, as there might be specific observed and unobserved characteristics that can be correlated across the two spells. To address these issues we now turn to a statistical model that takes into account the endogeneity of benefits and controls for correlated unobserved heterogeneity across unemployment and employment spells.

5 Econometric Model

To estimate the effect of unemployment benefits on unemployment and subsequent employment, both transitions are modeled. The econometric framework is a multi-spell mixed proportional hazard model (MPH) in continuous time (see Van der Berg, 2002, for a review of the MPH model). In line with most applications analyzing individual's labour market transitions, we follow a reduced-form approach. Before describing the econometric specification an econometric issue which concerns the endogeneity of benefits need to be highlighted. As described in Section 4.1.2, we observe a time-varying dummy variable for benefits denoted as, $b(t) = I(t_b \geq t_u)$, where t_u denotes unemployment duration and t_b denotes benefit duration. This variable indicates whether an individual receives benefits in each month during the unemployment spell. For no recipients ($t_b = 0$) and for those who have exhausted their benefits before the end of the unemployment spell ($t_b < t_u$), the indicator variable $b(t)$ is equal to zero. For those who still receive benefits i.e. ($t_b \geq t_u$), the benefit variable $b(t)$ is equal to one. In our model $b(t)$ is a predetermined variable as opposed to strictly exogenous since we can condition the probability to exit unemployment on the path of $b(t)$ up to t, but not on $b(t+1)$, $b(t+2)$, etc. as we do not observed the entire path of benefit duration. Following the detailed discussion in Bover, Arellano and Bentolila (2002), $b(t)$ becomes endogenous when considering models with unobserved heterogeneity.

Allowing for unobserved heterogeneity might be important as the benefit indicator may be correlated with these unobserved factors, such as human capital variables, or preferences.

The transition for person i for a spell k is defined as follows:[8]

$$\theta_{jik}(t_k \mid \varepsilon_{jik}) = \lambda_{jik}(t) \cdot \exp(y_{jik}) \tag{1}$$

where y_{jik} for the unemployment spell $j = u$ is defined as:

$$y_{uik} = \beta_{0u} + \beta_{1u} X_{uik} + \delta_u b_k(t) + \varepsilon_{uik} \tag{2}$$

while y_{jik} for the employment spell $j = e$ is defined as:

$$y_{eik} = \beta_{0e} + \beta_{1e} X_{eik} + \delta_{1e} b_{ek} + \delta_{2e} \tau_{uk1} + \delta_{3e} \tau_{uk2} + \varepsilon_{eik} \tag{3}$$

The effect of benefits on the transition rate to employment is measured by the parameter δ_u in the unemployment equation. The variable b_{ek} in the employment equation is a dummy which denotes whether or not the individual left previous unemployment receiving benefits. That is, the parameter δ_{1e} captures the effect of entering an employment spell while receiving benefits on the duration of this subsequent employment. To allow for this effect to vary across different previous unemployment duration, we also estimate a specification in which we interact the benefit indicator with dummies for previous unemployment duration denoted as τ_{uk1} and τ_{uk2}. The first dummy equals to 1 for previous unemployment duration of 1-6 months, while the second equals to 1 for previous unemployment duration of 7-12 months. With this specification the main effect δ_{1e} captures the effect of benefits on subsequent employment duration for those who exit unemployment after 12 months.[9]

The vectors X_{uik} and X_{eik} include personal characteristics and economic variables which are fixed within a spell but are allowed to vary across spells. Among the personal characteristics are age dummies, education dummies, whether or not the individual is married, the number of kids, and whether the spouse is not employed.

[8] The hazard is conditioned on the X_i variables, but for notational ease we make this conditioning implicit and condition explicitly only on ε.

[9] We choose these intervals in order to reflect the distinction between short and long term unemployed, as they are usually defined.

The vector X_{eik} includes also whether or not the employment is in a full time job. The economic variables include the regional unemployment rate at the time of entering unemployment and the time of entering employment, respectively.

The term $\lambda_{jik}(t)$ represents the baseline hazard which captures individual duration dependence. The baseline hazard has a semi-parametric representation using a piecewise constant function with monthly intervals:

$$\lambda_{jik}(t) = \exp(\sum\nolimits_d (\lambda_{jik,d} I_d(t)) \tag{4}$$

where the subscript $d = (1, 2, 3, 4)$ denotes the monthly intervals and $I_d(t)$ are time-varying dummy variables which are one in subsequent monthly intervals. 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. Since there is a constant included in the model, the normalization $\lambda_{jik,1} = 0$ is used. Finally, we represent the unobserved heterogeneity by a scalar random variable ε_{jik}.

Using the foregoing transition rates, we can now define the contribution of the unemployment and employment spells to the likelihood for each individual for a given spell. (In what follows we drop the i and k subscripts). The contribution of a completed unemployment and employment spell conditional on ε_{jik} is given by

$$f_j(t_j \mid \varepsilon_j) = \theta_j(t_j \mid \varepsilon_j) \exp(-\int_0^{t_j} \theta_j(s|.)ds) \tag{5}$$

while the contribution of a censored spell is given by

$$S_j(t_j \mid \varepsilon_j) = 1 - F_j(t_j \mid \varepsilon_j) = \exp(-\int_0^{t_j} \theta_j(s|.)ds) \tag{6}$$

where F_j's are distribution functions.

To account for endogeneity of benefits we specify a logistic process for benefits along the lines suggested by Bover, Arellano and Bentolila (2002) as follows:

$$\psi_{bik}(t_k|\varepsilon_{ui_k}) = P[b_k(t) = 1|\ b_k(t-1) = 1, T_{uik} \geq t_{uik}, \varepsilon_{ui_k}] = \Lambda(y_{bik}) \tag{7}$$

where Λ is the logistic cumulative distribution function and

$$y_{bik} = \beta_{0b} + \beta_{1b} X_{bik} + \varepsilon_{bi} \tag{8}$$

The vector X_{bik} includes individual and economic characteristics as for the unemployment spell. Combining the contribution of completed and censored unemployment spells with the logistic process for benefits, the likelihood for the unemployment spells can be written as:

$$L_u = \int ([f_u(t_u \mid \varepsilon_u)]^{c_u} [S_u(t_u \mid \varepsilon_u)]^{1-c_u})[f_b(t_u \mid \gamma_b, \varepsilon_b)]^{b_u} dG(\varepsilon_u, \varepsilon_b) \tag{9}$$

where $f_b(t_u \mid \gamma_b, \varepsilon_b) = [F(y_{bik})]^{b_k(t)} [1 - F(y_{bik})]^{1-b_k(t)}$ and b_u is a dummy which equals to 1 for recipients and zero for non-recipients. The likelihood for the employment spell is given by

$$L_e = \int [f_e(t_e \mid \varepsilon_e)]^{c_e} [S_e(t_e \mid \varepsilon_e)]^{1-c_e} dG(\varepsilon_e) \tag{10}$$

where c_u and c_e are dummy variables which takes the value of 1 if the spell is completed and the value of zero if the spell is censored for unemployment and employment spells, respectively. Therefore, the total contribution to the likelihood for each individual is given by

$$L = \int L_u \; L_e \; dG(\varepsilon_u, \varepsilon_b, \varepsilon_e) \tag{11}$$

We specify a discrete distribution for the unobserved heterogeneity following Heckman and Singer (1984). The support points are denoted by θ_{jp} and the corresponding probability mass is given by $\Pr(\theta_j = \theta_{jp}) = \pi_{jp}$, where P denotes the number of support points. Each unobserved factor is assumed to be time invariant and specific individual. That is, it is assumed to be the same across multiple spells of unemployment, or employment. However, as is discussed below, we allow the unobserved factors to be different and correlated across unemployment and employment spells. Identification of a multi-spell mixed proportional hazard model is achieved under weaker assumption than a single-spell mixed proportional hazard model, as has been shown by Honore (1993). In particular, he shows that no assumptions about the mixing distribution are needed with a fixed heterogeneity distribution over spells, although

the proportionality assumption between the unobserved heterogeneity term and the duration effect must be preserved. Van den Berg (2001) provides a detailed discussion of identification issues of the mixed proportional hazard model. We estimate the model by making different assumption about the unobserved heterogeneity:

(A1) There is no unobserved heterogeneity, so

$$\varepsilon_j = \beta_{0j}, \quad j = u, b, e$$

(A2) Unobserved heterogeneity components ε_u and ε_e are independent of each other and are drawn from a two-point distribution defined as

$$\begin{aligned} \varepsilon_j &= \varepsilon_{j1} \text{ with probability } \pi_{j1} \\ &= \varepsilon_{j1} \text{ with probability 1-}\pi_{j1}, \end{aligned} \tag{12}$$

respectively. However, ε_u and ε_b in the unemployment hazard are allowed to be correlated. The likelihood function for each $j = u, e$ can be written as follows:

$$L = L_j(H_j \mid \varepsilon_{j1})\pi_{j1} + L_j(H_j \mid \varepsilon_{j2})(1 - \pi_{j1}) \tag{13}$$

(A3) Finally, we estimate the model jointly allowing for correlation between the unobserved factors. Assuming a discrete distribution with two points of support for each of $\varepsilon_u, \varepsilon_b$, and ε_e the likelihood in this case for each individual can be written as follows:

$$L = (L_u(H_u|\varepsilon_{u1}, \varepsilon_{b1})L_e(H_e|\varepsilon_{e1})) \cdot \pi_1 + (L_u(H_u|\varepsilon_{u2}, \varepsilon_{b2})L_e(H_e|\varepsilon_{e2})) \cdot (1 - \pi_1) \tag{14}$$

where L_u and L_e are defined in (9) and (10), respectively. Finally, we obtain the total likelihood by summing over all spells of all individuals. In practice, we model unobserved heterogeneity by normalizing the first mass point to zero as we allow for a constant in the specification, so that the estimated coefficient for the second mass point denotes deviation from the constant term.

6 Empirical Results

6.1 Estimation results without Unobserved Heterogeneity

We first present estimation results under the assumption of no unobserved heterogeneity (Assumption A1 in the econometric section). Table 4 shows the coefficient estimates for the unemployment hazard without unobserved heterogeneity. We observe that in all countries, except Greece, the hazard rate out of unemployment is significantly lower for unemployed recipients compared to non-recipients controlling for other observed individual characteristics and regional unemployment rate at the time entering unemployment. For Italy, the estimates without unobserved heterogeneity indicate that recipients' unemployment exit rate is higher compared to non-recipients. Table 5 shows the coefficient estimates for the employment hazard without unobserved heterogeneity. The specification includes just the dummy of receiving benefits at the time of entry into employment from the previous unemployment spell. The basic result from this estimation seems to be that there is no effect of UI on subsequent employment duration as all coefficients, except for Italy, are not significant. However, as discussed previously, we need to control for unobserved characteristics and for selection into benefits in order to obtain the effect of benefits on the transitions from and to unemployment.

6.2 Estimation results with Unobserved Heterogeneity (Independent)

Assuming for the moment that the two processes are independent (Assumption A2), Table 6 and Table 7 show coefficient estimates of unemployment and employment hazard functions with unobserved heterogeneity. We report only the coefficients for benefits receipt, and estimates for duration dependence and unobserved heterogeneity. For the unemployment hazard in Table 6, we find significant unobserved heterogeneity for Greece, Italy, Portugal and Spain. Comparing the log-likelihood values of Table 6 with those of Table 4 we observe large differences for these countries and a bias for the effect of receiving benefits on the hazard out of unemployment. In particular, the coefficient of receiving benefits changes from 0.050 to -0.234 for Greece (significant at 10%), from 0.280 to -0.207 for Italy (significat at 10%), from -0.835 to -1.204

for Portugal, and from -0.234 to -0.460 for Spain. For the other countries, coefficient estimates are similar across the two models and LR tests cannot reject this hypothesis. The coefficients for the effect of duration on the exit rate out of unemployment indicate the presence of negative duration dependence as the hazard is lower for those with more than a year in unemployment. Controlling for unobserved heterogeneity we can distinguish between true and spurious duration dependence. Spurious duration dependence arises when those with more favorable labor market characteristics leave unemployment earlier so that the remaining pool of unemployed consists of individual with lower chances of moving into employment. Without taking into account these unobserved effects one may interpret this as negative duration dependence.

Estimation results for the employment hazard under the assumption of independence in Table 7 indicate significant unobserved heterogeneity in all countries. This has an effect on the estimated coefficients for the effect of benefits compared to the results in Table 5 without unobserved heterogeneity. In particular, benefit recipients are less likely to exit subsequent employment in Belgium, Denmark, France, Germany, and the UK. For Ireland, Italy, Portugal, and Spain we do not find a significant effect of benefits on employment stability.

6.3 Estimation results with Unobserved Heterogeneity (Correlated)

Finally, we estimate the model jointly allowing for correlated unobserved heterogeneity across the unemployment and employment spells. This is important as certain unobserved characteristics such as motivation or preferences may be affecting both the entry and exit rate from employment leading to a spurious correlation. Table 8 reports only the coefficient estimates for the effect of benefits on unemployment and employment hazard, the coefficients of duration dependence and unobserved heterogeneity. The estimates for the other regressors are reported in Table A.2 in the appendix. We allow for two mass points in each process and similarly with the independet estimations presented above we include a constant for each process. Therefore, we normalize one mass point to zero and we model the second mass point as the deviation from the constant term.

Regarding the unemployment hazard estimates we confirm the previous findings

that recipients' exit rates are significantly lower compared to non-recipients with the exception of Greece for which the effect becomes not significant, while for Italy is only at the 10% level. Turning now to the employment hazard estimates of the model with the correlated unobserved heterogeneity we observe some differences in the jointly estimated model compared to the model which was estimated under the independence assumption. In particular, for Demnark and Germany the benefit coefficient is larger and significant at 1% compared to 10%, previously. Moreover, for Italy, and Spain we now find a significant negative effect of receiving benefits on subsequent employment hazard. For France, the effect of benefits is not significant in the model with correlated unobserved heterogeneity. Estimating the specification in which the benefit variable is interacted with previous unemployment duration we observe that the effect is significant for recipients who have remained unemployed for at least 1 year, as it is shown in Table 9. Interacting benefits with duration between 1-6 months and 7-12, the coefficient of benefits captures the effect for the recipients with unemployment duration more than 12 months compared to non-recipients. This effect is also significant for Belgium and Spain.

6.4 Effect of other characteristics and the business cycle

The main results for the effect of individual characteristics on the unemployment hazard can be summarized as follows (from Table A.2): those unemployed who are above 50 years old (the reference age group) have lower exit rate from unemployment, while those who are more educated, who are married, and have more kids, are in general more likely to leave unemployment. These results are in line with the main findings in the literature. The effect of business cycle as this is captured by the regional unemployment rate at the time of entry into unemployment shows that higher regional unemployment rate in Germany, and Portugal significantly increases the unemployment hazard, while the effect is significantly negative for Italy.

As for the effect of the individual characteristics on the employment hazard we find a mixed picture with the effects to differ across countries (Table A.2). This is one of the reasons that performing pooled country estimation may be not justified as the assumption of common effects across countries is not supported by the data.

One effect that is worth mentioning and follows a common pattern across a number of countries is the effect of regional unemployment rate at the time of entering the employment spell. The coefficients for Belgium, France, Germany, Greece, Italy, Portugal, and Spain are all positive and in most of them significant. This indicates a business cycle effect in which the employment stability is worse in thin markets.

6.5 Expected Durations

In order to obtain a magnitude of the effect of benefits, the mean unemployment and employment durations are computed. This is done for the total sample, by benefits receipt, and for the two different types based on the unobserved heterogeneity terms that have been identified. Furthermore, for the employment duration the sample is split by the months spent previously in unemployment. The mean unemployment durations presented in Table 10 reflect the results from the econometric analysis presented above. In particular, receiving benefits increases the mean unemployment duration relative to non-recipients. The magnitude of this increase varies from 4 months in Belgium, to 5 months in Denmark, 7 months in France, and 11 months in Germany, for instance. Note also that the mean unemployment duration differs little between the two different types of unemployed.

For benefits to have a positive net impact their effect on subsequent employment should compensate for the longer unemployment spells. We first compute the mean employment duration separately for the sample of recipients and non-recipients. Table 10 shows that for France, Germany, Portugal, Spain, and UK the mean employment duration for recipients is either similar or higher than the one for non-recipients. The difference is of the order of a month as for Germany, and Spain, and 3 months as for France, and the UK. As it was shown above in Table 9, the effect of benefits differs depending on the time spent in previous unemployment, so we then compute mean employment duration for recipients and non-recipients by previous unemployment duration. For non-recipients the mean employment duration is decreasing with previous unemployment duration in almost all cases, that is, the longer individuals remain in unemployment without compensation the worse it is for their subsequent employment stability. For recipients, this decline is either slower as for instance

in Germany, or it is non-linear, as in Denmark, France, and the UK. Comparing the mean employment duration between recipients and non-recipients with different unemployment experiences we observe much larger differences in months spent in employment. For Belgium, recipients with more than 6 months in unemployment of Type A (who have better employment prospects due to unobserved effects) stay on average 5 months more in employment compared to non-recipients. This compensates for the additional time spent in unemployment compared to non-recipietns (on average 4 months). The picture is similar for the other countries except Greece. That is, recipients who enter employment after having spent some time in unemployment (at least 6 months) have longer employment spells of about 4-6 months compared to non-recipients. Therefore, we observe that the benefits improve the employment stability of those recipients who do not find employment within the first few months after they entered unemployment. Although this effect does not compensate fully for the additional time spent in unemployment in all cases, it shows that unemployment insurance can have post-unemployment effects by increasing employment stability. On average, taking into account the probability of being one of the two types, recipients stay about 4 months longer in employment compared to non-recipients, which represents a 20% increase relative to the average expected employment duration.

7 Conclusions

In this paper we have investigated the effect of UI both on unemployment duration and subsequent employment stability for a number of European countries using individual data from the European Community Household Panel (ECHP, 1994-2001). While the effect of UI on unemployment duration has been widely studied, little is known of its effect on post-unemployment employment duration. The empirical analysis is based on multivariate proportional hazard models allowing for correlated unobserved heterogeneity across multiple observed unemployment and employment spells and controlling for selection into benefits. Our findings on the effect of UI on unemployment duration confirm previous empirical studies indicating that receipt of benefits lowers the unemployment hazard. The main contribution of the study is

that provides evidence for a beneficial effect of UI on subsequent employment duration. This effect is significant in all countries except Greece, Ireland, and Portugal, which are characterized by a relatively less generous UI system. In particular, we find that benefit recipients have longer employment spells of about 4 months compared to non-recipients, which represents a 20% increase relative to the average employment duration. Although this effect does not compensate fully for the additional time spent in unemployment in all cases, it shows that unemployment insurance can have post-unemployment effects by increasing employment stability. These results support the matching hypothesis according to which benefits allow workers to search longer and select employment offers which are better matches without being forced to accept the first available offer as is the case for the non-recipients. Therefore, our results provide support for the beneficial role of UI on improving employment stability, an issue which has been neglected in the empirical literature of the effect of UI.

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Figure 1

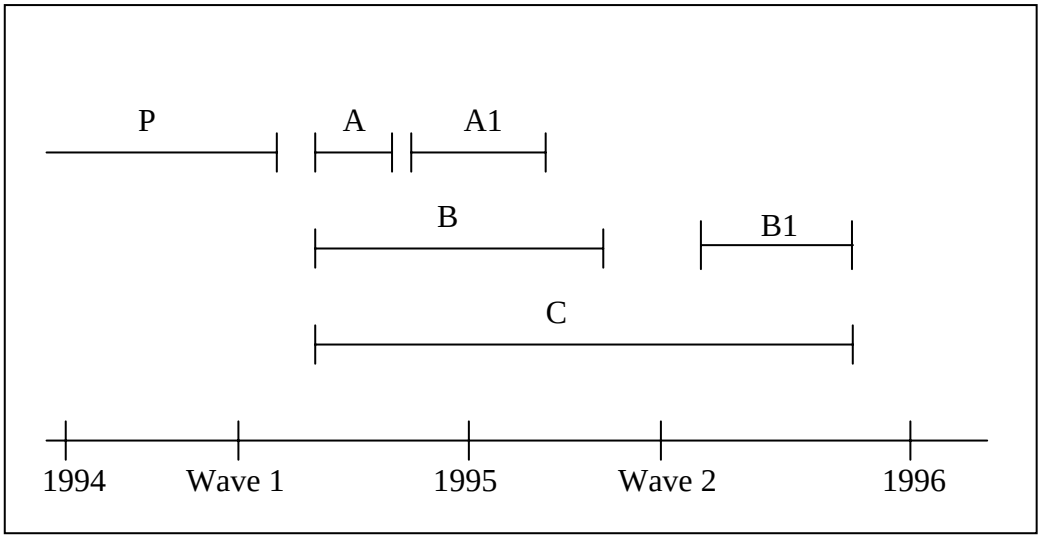

Table 1. Transitions between unemployment and employment in the sample by country.

	Number of Unemployment Spells	Number of Spells Exit to Employment	Number of Spells Exit to Unemployment
Belgium	246	170 (69.11)	62 (25.20)
Denmark	352	262 (74.43)	92 (26.14)
France	842	569 (67.58)	223 (26.48)
Germany	1150	732 (63.65)	314 (27.30)
Greece	971	759 (78.17)	483 (49.74)
Ireland	441	333 (75.51)	99 (22.45)
Italy	1364	1012 (74.19)	559 (40.98)
Portugal	640	446 (69.69)	172 (26.88)
Spain	2324	1776 (76.42)	977 (42.04)
UK	537	422 (78.58)	118 (21.97)

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

Table 2. Summary statistics of unemployment spells by benefits.

	Belgium		Denmark		France		Germany	
	B	NB	B	NB	B	NB	B	NB
Number of Spells	148	98	242	110	479	363	758	392
Higher Education	0.236	0.296	0.272	0.200	0.163	0.234	0.164	0.163
Secondary Education	0.392	0.428	0.484	0.518	0.447	0.377	0.580	0.574
Less than Secondary Education	0.372	0.276	0.244	0.282	0.390	0.388	0.256	0.263
Age	35.39	34.71	38.34	35.64	34.66	32.43	39.02	36.37
Being Married	0.486	0.520	0.462	0.381	0.399	0.369	0.626	0.559
Number of Kids	0.676	0.959	0.628	0.536	0.852	0.758	0.767	0.719
Spouse Non-Employed	0.345	0.255	0.247	0.200	0.276	0.223	0.329	0.276

	Greece		Ireland		Italy		Portugal	
	B	NB	B	NB	B	NB	B	NB
Number of Spells	255	716	324	135	280	1084	171	469
Higher Education	0.133	0.156	0.068	0.162	0.039	0.045	0.018	0.026
Secondary Education	0.384	0.345	0.370	0.346	0.257	0.310	0.123	0.119
Less than Secondary Education	0.482	0.499	0.563	0.492	0.704	0.645	0.860	0.855
Age	37.21	35.28	35.48	35.94	39.49	33.73	40.28	33.80
Being Married	0.624	0.514	0.505	0.446	0.704	0.433	0.719	0.458
Number of Kids	0.769	0.683	1.257	1.031	0.936	0.567	0.848	0.857
Spouse Non-Employed	0.404	0.318	0.386	0.254	0.379	0.287	0.322	0.228

	Spain		UK	
	B	NB	B	NB
Number of Spells	973	1351	187	350
Higher Education	0.101	0.141	0.439	0.480
Secondary Education	0.141	0.192	0.102	0.109
Less than Secondary Education	0.758	0.666	0.460	0.411
Age	37.55	32.69	36.55	34.95
Being Married	0.659	0.391	0.481	0.460
Number of Kids	0.906	0.662	0.936	0.869
Spouse Non-Employed	0.490	0.277	0.321	0.234

Source: ECHP (1994-2001) Own Calculations. B refers to Benefit Recipients and NB refers to Non-Recipients.

Table 3a. Empirical Survivor Functions by Benefits (Proportion Remaining Unemployed).

	Unemployment									
	Belgium		Denmark		France		Germany		Greece	
	B	NB	B	NB	B	NB	B	NB	B	NB
Months										
1	0.953	0.929	0.971	0.973	0.979	0.948	0.983	0.936	0.965	0.968
	(0.017)	(0.026)	(0.011)	(0.016)	(0.007)	(0.012)	(0.005)	(0.012)	(0.012)	(0.007)
6	0.623	0.422	0.471	0.297	0.634	0.503	0.668	0.432	0.328	0.423
	(0.041)	(0.052)	(0.033)	(0.049)	(0.023)	(0.028)	(0.017)	(0.027)	(0.031)	(0.019)
12	0.470	0.244	0.308	0.198	0.475	0.333	0.493	0.277	0.200	0.225
	(0.043)	(0.048)	(0.031)	(0.047)	(0.024)	(0.028)	(0.019)	(0.028)	(0.027)	(0.017)

	Unemployment									
	Ireland		Italy		Portugal		Spain		UK	
	B	NB	B	NB	B	NB	B	NB	B	NB
Months										
1	0.971	0.939	0.975	0.967	0.988	0.945	0.975	0.945	0.968	0.951
	(0.010)	(0.021)	(0.009)	(0.005)	(0.008)	(0.011)	(0.005)	(0.006)	(0.013)	(0.012)
6	0.614	0.347	0.407	0.551	0.817	0.457	0.537	0.443	0.626	0.385
	(0.029)	(0.044)	(0.031)	(0.016)	(0.030)	(0.025)	(0.017)	(0.014)	(0.036)	(0.027)
12	0.351	0.202	0.212	0.346	0.670	0.272	0.316	0.226	0.421	0.266
	(0.029)	(0.039)	(0.026)	(0.015)	(0.038)	(0.023)	(0.016)	(0.013)	(0.038)	(0.025)

Notes: ECHP (1994-2001) Own calculations. The standard errors in parentheses account for "right censoring" of the data. B refers to Benefit Recipients and NB refers to Non-Recipients.

Table 3b. Empirical Survivor Functions by Benefits (Proportion Remaining Employed).

PANEL A (Employment)

	Belgium		Denmark		France		Germany		Greece	
	B	NB	B	NB	B	NB	B	NB	B	NB
Months										
1	0.949	0.972	0.989	0.975	0.991	0.984	0.996	0.984	0.985	0.993
	(0.022)	(0.020)	(0.008)	(0.018)	(0.005)	(0.008)	(0.003)	(0.008)	(0.008)	(0.004)
6	0.822	0.843	0.876	0.867	0.857	0.734	0.903	0.844	0.669	0.764
	(0.039)	(0.044)	(0.025)	(0.039)	(0.020)	(0.029)	(0.014)	(0.024)	(0.033)	(0.018)
12	0.758	0.690	0.715	0.774	0.737	0.587	0.712	0.675	0.270	0.488
	(0.045)	(0.057)	(0.035)	(0.050)	(0.026)	(0.033)	(0.022)	(0.032)	(0.032)	(0.022)

	Ireland		Italy		Portugal		Spain		UK	
	B	NB	B	NB	B	NB	B	NB	B	NB
Months										
1	0.996	0.971	0.987	0.987	0.989	0.986	0.985	0.980	0.993	0.986
	(0.004)	(0.016)	(0.008)	(0.004)	(0.011)	(0.006)	(0.004)	(0.004)	(0.007)	(0.007)
6	0.872	0.901	0.706	0.746	0.934	0.822	0.679	0.722	0.878	0.874
	(0.023)	(0.030)	(0.031)	(0.016)	(0.026)	(0.021)	(0.017)	(0.014)	(0.028)	(0.020)
12	0.780	0.810	0.335	0.539	0.847	0.684	0.489	0.544	0.823	0.807
	(0.029)	(0.041)	(0.335)	(0.019)	(0.039)	(0.026)	(0.019)	(0.017)	(0.033)	(0.025)

PANEL B (Employment for Previous Unemployment > 6 months)

	Belgium		Denmark		France		Germany		Greece	
	B	NB	B	NB	B	NB	B	NB	B	NB
Months										
1	0.941	0.950	0.973	0.975	0.995	0.990	0.996	0.951	0.988	0.995
	(0.033)	(0.049)	(0.019)	(0.018)	(0.005)	(0.010)	(0.004)	(0.028)	(0.012)	(0.005)
6	0.750	0.733	0.860	0.813	0.867	0.717	0.906	0.806	0.459	0.693
	(0.063)	(0.102)	(0.041)	(0.098)	(0.026)	(0.045)	(0.018)	(0.053)	(0.056)	(0.033)
12	0.683	0.536	0.754	0.731	0.744	0.498	0.727	0.632	0.304	0.546
	(0.068)	(0.114)	(0.052)	(0.117)	(0.036)	(0.052)	(0.029)	(0.066)	(0.053)	(0.036)

	Ireland		Italy		Portugal		Spain		UK	
	B	NB	B	NB	B	NB	B	NB	B	NB
Months										
1	0.964	0.969	0.980	0.987	0.986	0.971	0.979	0.981	0.957	0.989
	(0.016)	(0.031)	(0.014)	(0.006)	(0.014)	(0.015)	(0.007)	(0.007)	(0.021)	(0.011)
6	0.850	0.769	0.535	0.716	0.929	0.798	0.662	0.687	0.900	0.830
	(0.031)	(0.077)	(0.050)	(0.024)	(0.031)	(0.035)	(0.024)	(0.023)	(0.032)	(0.041)
12	0.758	0.643	0.349	0.573	0.881	0.767	0.511	0.519	0.840	0.751
	(0.038)	(0.093)	(0.048)	(0.026)	(0.040)	(0.037)	(0.026)	(0.026)	(0.039)	(0.048)

Notes: ECHP (1994-2001) Own calculations. The standard errors in parenthesis account for "right censoring" of the data. B refers to Benefit Recipients and NB refers to Non-Recipients.

Table 4. Unemployment Hazard and Benefit Selection Equation Estimates without Unobserved Heterogeneity.

	Belgium		Denmark		France		Germany		Greece	
Unemployment	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.
Reveiving Benefits	-0.432	0.165 **	-0.412	0.143 ***	-0.396	0.088 ***	-0.669	0.083 ***	0.050	0.083
High Education	0.302	0.236	-0.153	0.177	0.159	0.126	0.497	0.129 ***	-0.015	0.107
Secondary Education	0.084	0.213	-0.077	0.152	0.328	0.097 ***	0.297	0.097 ***	-0.091	0.084
Age 20-24	1.889	0.445 ***	0.110	0.276	1.885	0.239 ***	1.213	0.169 ***	0.328	0.171 *
Age 25-29	1.891	0.423 ***	0.634	0.241 ***	1.789	0.231 ***	1.334	0.154 ***	0.461	0.151 ***
Age 30-39	1.921	0.406 ***	0.729	0.210 ***	1.634	0.223 ***	1.321	0.135 ***	0.542	0.143 ***
Age 40-49	1.647	0.416 ***	0.612	0.233 ***	1.507	0.225 ***	1.028	0.137 ***	0.278	0.135 **
Married	0.423	0.187 **	0.041	0.160	0.167	0.119	0.210	0.100 **	0.261	0.129 **
Number of Kids	-0.039	0.086	0.026	0.077	0.047	0.044	0.029	0.042	0.057	0.051
Spouse Non-Employed	-0.274	0.208	-0.365	0.158 **	0.090	0.110	-0.170	0.093 *	0.074	0.099
Regional Unem. Rate	-0.032	0.030	-0.159	0.117	-0.007	0.017	0.019	0.010 *	-0.025	0.021
Duration 6-12 Months	-0.380	0.202 *	-0.503	0.177 **	-0.353	0.111	-0.307	0.094 ***	-0.307	0.094 ***
Duration 12-24 Months	-0.569	0.240 **	-0.986	0.226 ***	-0.466	0.118 ***	-0.224	0.094 *	-1.193	0.152 ***
Duration 24+ Months	-1.439	0.441 ***	-1.907	0.352 ***	-1.102	0.181 ***	-0.815	0.118 ***	-2.075	0.242 ***
Constant	-4.271	0.833 ***	-2.015	0.748 ***	-4.687	0.398 ***	-1.868	0.175 ***	-3.014	0.355 ***
Benefit Equation										
High Education	-0.444	0.379	0.418	0.350	-0.330	0.197 *	-0.224	0.209	-0.031	0.227
Secondary Education	-0.402	0.337	0.133	0.286	0.153	0.160	-0.091	0.153	0.251	0.167
Age	0.004	0.016	0.021	0.013	0.025	0.008 ***	0.019	0.007 ***	0.009	0.010
Married	-0.121	0.319	0.054	0.308	-0.312	0.195	-0.040	0.170	0.258	0.263
Number of Kids	-0.327	0.137 **	0.089	0.144	0.067	0.071	0.075	0.072	-0.003	0.096
Spouse Non-Employed	0.534	0.348	0.183	0.292	0.183	0.179	0.112	0.155	0.081	0.196
Regional Unem. Rate	0.095	0.045 **	0.194	0.048 ***	0.013	0.026	0.047	0.016 ***	0.092	0.033 ***
Constant	-0.405	0.796	-2.012	0.682 ***	-0.691	0.421 *	-0.588	0.291 **	-2.790	0.534 ***
Log-Likelihood	-945.99		1333.13		-3473.11		-4370.76		-5113.05	

	Ireland		Italy		Portugal		Spain		UK	
Unemployment	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.
Reveiving Benefits	-0.510	0.128 ***	0.280	0.079 ***	-0.835	0.126 ***	-0.234	0.052 ***	-0.344	0.106 ***
High Education	0.208	0.198	0.318	0.160 **	0.149	0.300	-0.006	0.076	0.245	0.107 **
Secondary Education	0.179	0.123	0.113	0.074	0.176	0.151	-0.060	0.066	-0.034	0.176
Age 20-24	0.533	0.233 **	0.319	0.154 **	0.728	0.203 ***	0.721	0.107 ***	0.527	0.195 **
Age 25-29	0.470	0.239 **	0.351	0.142 ***	0.864	0.202 ***	0.745	0.103 ***	0.452	0.192 **
Age 30-39	0.353	0.194 *	0.450	0.120 ***	0.500	0.183 ***	0.661	0.093 ***	0.302	0.187 **
Age 40-49	0.269	0.188	0.330	0.123 ***	0.550	0.178 ***	0.566	0.096 ***	0.175	0.179
Married	0.264	0.192	0.387	0.114 ***	0.149	0.134	0.138	0.078 *	0.176	0.133
Number of Kids	0.033	0.049	0.028	0.041	0.049	0.049	-0.018	0.027	-0.075	0.052
Spouse Non-Employed	-0.109	0.162	-0.037	0.089	0.134	0.133	0.127	0.072 *	-0.273	0.130 **
Regional Unem. Rate	0.020	0.058	-0.016	0.004 ***	0.046	0.017 **	0.003	0.004	-0.028	0.021
Duration 6-12 Months	-0.016	0.133	-0.180	0.076 **	-0.315	0.123 **	-0.131	0.058 **	-0.507	0.137 ***
Duration 12-24 Months	-0.555	0.174 ***	-0.994	0.111 ***	-0.953	0.159 ***	-0.791	0.084 ***	-0.612	0.147 ***
Duration 24+ Months	-1.168	0.270 ***	-1.574	0.148 ***	-1.495	0.195 ***	-1.353	0.121 ***	-1.818	0.228 ***
Constant	-3.471	0.821 ***	-3.015	0.275 ***	-3.838	0.396 ***	-3.228	0.179 ***	-2.497	0.362 ***
Benefit Equation										
High Education	-1.050	0.357 ***	0.197	0.362	-0.401	0.675	-0.084	0.143	-0.150	0.194
Secondary Education	-0.119	0.235	0.103	0.168	0.299	0.291	-0.176	0.124	-0.175	0.317
Age	-0.016	0.012	0.038	0.009 ***	0.035	0.010 ***	0.020	0.005 ***	0.018	0.010 *
Married	-0.163	0.341	0.674	0.238 ***	0.761	0.257 ***	0.732	0.139 ***	-0.307	0.245
Number of Kids	0.067	0.098	0.271	0.082 ***	-0.061	0.091	0.010	0.050	0.029	0.087
Spouse Non-Employed	0.697	0.310 **	-0.555	0.177 ***	-0.236	0.236	0.101	0.127	0.456	0.228 **
Regional Unem. Rate	0.081	0.039 **	0.000	0.008	-0.090	0.033 ***	0.034	0.007 ***	0.045	0.031
Constant	0.461	0.626	-3.185	0.341 ***	-1.914	0.422 ***	-2.127	0.240 ***	-1.476	0.440 ***
Log-Likelihood	-1710.42		-6627.33		-2514.62		-12263.85		-2033.10	

Notes: ***,**,and * denote significance at the 1%, 5%, and 10% level, respectively. Year dummies are included.

Table 5. Employment Hazard Estimates without Unobserved Heterogeneity.

	Belgium			Denmark			France			Germany			Greece		
Employment	Coef.	s.e		Coef.	s.e		Coef.	s.e		Coef.	s.e		Coef.	s.e	
Reveiving Benefits (RB)	-0.329	0.241		-0.054	0.228		-0.039	0.102		-0.048	0.095		0.100	0.072	
Unem. Duration (1-6 Months)	-0.827	0.313		-0.569	0.366		0.052	0.135		0.033	0.115		-0.036	0.132	
Unem. Duration (7-12 Months)	-1.127	0.436		-0.376	0.411		0.307	0.160		0.008	0.134		-0.087	0.151	
High Education	-0.532	0.391		-0.237	0.265		0.283	0.156		-0.086	0.155		-0.222	0.106	**
Secondary Education	-0.938	0.295	***	0.104	0.201		0.132	0.115		-0.115	0.103		0.148	0.075	*
Age 20-24	-0.999	0.640		0.054	0.424		0.880	0.318	***	0.075	0.174		-0.212	0.162	*
Age 25-29	-1.351	0.653	*	-0.118	0.321		0.367	0.314		0.121	0.153		0.091	0.142	
Age 30-39	-0.063	0.606		-0.051	0.308		0.499	0.318		0.139	0.143		-0.017	0.126	
Age 40-49	-1.118	0.631	**	0.034	0.303		0.244	0.320		0.092	0.141		0.107	0.111	
Married	-0.030	0.287		-0.265	0.265		-0.008	0.152		-0.083	0.109		-0.193	0.125	*
Number of Kids	0.101	0.108		0.330	0.102	**	-0.091	0.061		0.022	0.046		0.016	0.045	
Spouse Non-Employed	-1.058	0.312	***	0.012	0.207		0.281	0.137	*	0.056	0.099		0.176	0.088	*
Full Time Job	0.079	0.416		-0.864	0.346	**	0.213	0.135		-0.554	0.147	***	-0.056	0.116	
Regional Unem. Rate	0.090	0.041	***	-0.100	0.086		-0.024	0.021		0.013	0.012		-0.016	0.021	
Duration 6-12 Months	0.175	0.229		0.629	0.181	**	0.216	0.114	**	0.839	0.102	***	1.205	0.072	***
Duration 12-24 Months	0.690	0.269	***	0.360	0.226	*	-0.113	0.147		0.530	0.118	***	1.162	0.071	
Duration 24+ Months	0.768	0.468	*	0.214	0.275		0.323	0.182	*	0.525	0.137	***	0.029	0.122	**
Constant	-1.262	1.014		0.214	1.162		-2.736	0.459	***	-2.876	0.304	***	0.265	0.144	***
Log-Likelihood	-497.55			-799.55			-1911.66			-2879.40			-5202.15		

	Ireland			Italy			Portugal			Spain			UK		
Employment	Coef.	s.e		Coef.	s.e		Coef.	s.e		Coef.	s.e		Coef.	s.e	
Reveiving Benefits (RB)	-0.061	0.193		0.115	0.073	**	0.077	0.195		0.017	0.048		0.034	0.166	
Unem. Duration (1-6 Months)	-0.013	0.231		0.079	0.107	**	0.149	0.203		0.060	0.075		0.010	0.193	
Unem. Duration (7-12 Months)	0.151	0.227		0.234	0.116	**	0.389	0.230		0.120	0.082		-0.308	0.270	
High Education	0.325	0.305		0.192	0.159		2.269	0.751	***	-0.027	0.081		-0.432	0.152	**
Secondary Education	0.133	0.174		-0.152	0.073	*	-0.050	0.198		-0.029	0.067		-0.947	0.272	***
Age 20-24	0.405	0.330		0.259	0.162	**	-0.041	0.238		0.012	0.100		0.613	0.269	**
Age 25-29	0.118	0.355		0.062	0.140		0.198	0.243		-0.009	0.096		0.381	0.258	
Age 30-39	0.629	0.283	**	0.066	0.110		0.132	0.203		-0.066	0.085		0.245	0.250	
Age 40-49	0.611	0.285	**	-0.045	0.112		0.057	0.208		0.063	0.086		0.226	0.255	
Married	-0.073	0.222		0.195	0.120		-0.259	0.176		-0.037	0.080		0.303	0.199	
Number of Kids	0.065	0.073		-0.083	0.042	*	0.144	0.053	**	0.040	0.028		0.270	0.079	***
Spouse Non-Employed	-0.628	0.221	*	-0.163	0.087	**	0.180	0.161		-0.131	0.074	**	-0.449	0.201	**
Full Time Job	0.221	0.157	*	0.122	0.103		-0.037	0.216		-0.203	0.079	**	-0.404	0.226	**
Regional Unem. Rate	0.004	0.067	*	0.017	0.004	**	0.109	0.022	***	0.018	0.004	***	-0.035	0.033	
Duration 6-12 Months	0.248	0.183		0.878	0.065	**	0.434	0.135	***	0.309	0.053	***	-0.096	0.181	***
Duration 12-24 Months	0.015	0.211		-0.134	0.118		0.454	0.151	***	-0.419	0.076	***	0.267	0.185	
Duration 24+ Months	0.414	0.236	**	0.196	0.142	**	0.835	0.221	***	-0.056	0.088		0.498	0.230	
Constant	-3.685	1.020	***	-3.253	0.226	**	-4.762	0.491	***	-2.498	0.168	***	-2.521	0.442	**
Log-Likelihood	-850.15			-5368.73			-1482.37			-10295.52			-916.69		

Notes: ***,**,and * denote significance at the 1%, 5%, and 10% level, respectively. Year dummies are included.

Table 6. Unemployment Hazard and Benefit Selection Equation Estimates with Unobserved Heterogeneity.

	Belgium			Denmark			France			Germany			Greece		
Unemployment	Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.	
Reveiving Benefits	-0.460	0.225	**	-0.412	0.143	***	-0.396	0.088	***	-0.736	0.113	***	-0.234	0.141	*
Duration 6-12 Months	-0.379	0.202	*	-0.503	0.177	***	-0.353	0.111		-0.204	0.100	**	-0.279	0.096	***
Duration 12-24 Months	-0.567	0.241	**	-0.986	0.226	***	-0.466	0.118	***	-0.785	0.128	***	-1.157	0.154	***
Duration 24+ Months	-1.437	0.441	***	-1.907	0.352	***	-1.102	0.181	***	-1.829	0.185	***	-2.024	0.244	***
Unobs. Heterogeneity															
Mass Point 1 Unem	-4.375	1.049	***	-2.015	0.682	***	-4.687	0.398	***	-3.940	0.556	***	-3.111	0.362	***
Mass Point 2 Unem	0.131	0.741								-0.584	0.471		0.405	0.162	**
Mass Point 1 Benefits	-2.261	5.123		-2.012	0.695	***	-0.691	0.421	*	1.456	5.185		-4.394	0.987	***
Mass Point 2 Benefits	1.932	4.610								-2.204	5.070		3.493	0.331	***
Prob	0.142	5.369								0.074	2.510		0.741	0.249	***
Log-Likelihood	-945.72			-1333.13			-3473.11			-4369.94			-5019.88		

	Ireland			Italy			Portugal			Spain			UK		
Unemployment	Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.	
Reveiving Benefits	-0.561	0.199	***	-0.207	0.125	*	-1.204	0.163	***	-0.460	0.075	***	-0.345	0.143	**
Duration 6-12 Months	-0.016	0.133		-0.124	0.079		-0.129	0.132		-0.101	0.060	*	-0.507	0.136	***
Duration 12-24 Months	-0.553	0.166	***	-0.910	0.116	***	-0.549	0.187	***	-0.731	0.088	***	-0.612	0.147	***
Duration 24+ Months	-1.163	0.269	***	-1.458	0.154	***	-0.646	0.267	**	-1.268	0.127	***	-1.818	0.228	***
Unobs. Heterogeneity															
Mass Point 1 Unem	-3.490	0.800	***	-3.156	0.286	***	-3.735	0.427	***	-3.331	0.185	***	-2.496	0.362	***
Mass Point 2 Unem	0.091	0.265		0.697	0.139	***	-2.983	0.770	***	0.469	0.119	***	0.004	0.301	
Mass Point 1 Benefits	-0.233	0.845		-5.587	0.813	***	-1.841	0.432	***	-3.633	0.432	***	-2.179	0.625	***
Mass Point 2 Benefits	19.7			3.845	0.315	***	-1.722	2.287		2.474	0.195	***	21.6		
Prob	0.513	0.452		0.792	0.236	***	0.895	0.360	***	0.709	0.260	***	0.895	0.418	***
Log-Likelihood	-1707.88			-6485.11			-2505.60			-12170.51			-2030.47		

Notes: ***,**,and * denote significance at the 1%, 5%, and 10% level, respectively. The estimation includes all the regressors as in Table 4 and year dummies. The reported second mass point denotes the deviation from the first mass point.

Table 7. Employment Hazard Estimate with Unobserved Heterogeneity.

	Belgium			Denmark			France			Germany			Greece		
Employment	Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.	
Reveiving Benefits (RB)	-1.832	0.310	***	-0.414	0.222	*	-0.232	0.139	*	-0.193	0.115	*	-0.028	0.109	
Unem. Duration (1-6 Months)	-0.817	0.313	***	-0.823	0.386	**	0.008	0.154		0.001	0.142		-0.073	0.161	
Unem. Duration (7-12 Months)	-1.426	0.434	***	-0.091	0.419		0.155	0.192		-0.259	0.184		0.023	0.186	
Duration 6-12 Months	0.747	0.252	***	1.235	0.202	***	0.815	0.132	***	1.059	0.106	***	1.436	0.085	***
Duration 12-24 Months	2.381	0.382	***	1.789	0.306	***	1.252	0.213	***	1.437	0.145	***	0.611	0.160	***
Duration 24+ Months	2.788	0.590	***	2.260	0.402	***	1.971	0.264	***	2.694	0.257	***	0.986	0.193	***
Unobserved Heterogeneity															
Mass Point 1	0.379	1.011		-0.060	1.236		-3.164	0.601	***	-2.008	0.434	***	-2.152	0.442	***
Mass Point 2	-3.929	0.489	***	-2.510	0.297	***	-2.055	0.181	***	-2.521	0.214	***	-1.073	0.119	***
Prob	0.847	0.411	***	0.651	0.262	**	0.638	0.202	***	0.765	0.187	***	0.549	0.378	
Log-Likelihood	-472.19			-778.83			-1859.22			-2801.64			-5170.62		

	Ireland			Italy			Portugal			Spain			UK		
Employment	Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.	
Reveiving Benefits	0.034	0.194		-0.036	0.095		0.339	0.228		-0.052	0.062		-0.469	0.175	***
Unem. Duration (1-6 Months)	-0.042	0.246		-0.084	0.148		0.057	0.224		-0.027	0.098		-0.135	0.202	
Unem. Duration (7-12 Months)	-0.107	0.244		0.301	0.156	*	0.170	0.276		0.037	0.105		-0.279	0.332	
Duration 6-12 Months	1.851	0.259	***	1.356	0.078	***	0.911	0.157	***	0.592	0.061	***	0.837	0.205	***
Duration 12-24 Months	2.227	0.337	***	0.864	0.144	***	1.322	0.208	***	0.389	0.101	***	2.288	0.279	***
Duration 24+ Months	2.910	0.388	***	1.350	0.175	***	2.142	0.311	***	1.040	0.132	***	3.143	0.364	***
Unobserved Heterogeneity															
Mass Point 1	-0.933	0.968		-2.984	0.304	***	-4.937	0.590	***	-2.049	0.224	***	-3.516	0.476	***
Mass Point 2	-3.411	0.303	***	-1.600	0.107	***	-1.806	0.211	***	-1.403	0.092	***	-3.128	0.279	***
Prob	0.442	0.214		0.631	0.174	***	0.556	0.231		0.657	0.180	***	0.633	0.210	***
Log-Likelihood	-812.36			-5265.49			-1467.45			-10159.97			-875.43		

Notes: ***,**,and * denote significance at the 1%, 5%, and 10% level, respectively. The estimation includes all the regressors as in Table 5 and year dummies. The reported second mass point denotes the deviation from the first mass point.

Table 8. Unemployment, Benefit Selection Equation, and Employment Hazard Estimates with Unobserved Heterogeneity.

	Belgium			Denmark			France			Germany			Greece		
Unemployment	Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.	
Reveiving Benefits	-0.492	0.193	***	-0.446	0.147	***	-0.389	0.091	***	-0.742	0.095	***	-0.187	0.142	
Duration Dependence															
Duration 6-12 Months	-0.370	0.203	*	-0.474	0.180	***	-0.352	0.111	***	-0.217	0.095	**	-0.285	0.096	***
Duration 12-24 Months	-0.552	0.244	**	-0.966	0.228	***	-0.466	0.118	***	-0.802	0.119	***	-1.164	0.154	***
Duration 24+ Months	-1.425	0.442	***	-1.879	0.355	***	-1.103	0.181	***	-1.853	0.176	***	-2.035	0.244	***
Employment															
Reveiving Benefits (RB)	-1.539	0.284	***	-0.663	0.232	***	-0.352	0.222		-0.376	0.115	***	-0.148	0.125	
Un. Duration (1-6 Months)	-1.586	0.336	***	-1.346	0.386	***	0.027	0.163		0.009	0.141		-0.010	0.133	
Un. Duration (7-12 Months)	-1.684	0.419	***	0.184	0.413		0.128	0.212		-0.132	0.160		-0.016	0.155	
Duration Dependence															
Duration 6-12 Months	0.897	0.261	***	1.565	0.230	***	0.858	0.169	***	1.065	0.106	***	1.222	0.073	***
Duration 12-24 Months	2.232	0.363	***	2.241	0.346	***	1.245	0.227	***	1.398	0.137	***	0.145	0.126	
Duration 24+ Months	3.222	0.622	***	2.596	0.417	***	1.905	0.331	***	2.621	0.233	***	0.413	0.152	***
Unobs. Heterogeneity															
Mass Point 1 Unem	-4.382	0.855	***	-2.145	0.764	***	-4.654	0.410	***	-4.607	0.288	***	-3.055	0.359	***
Mass Point 2 Unem	0.204	0.323		0.277	0.222		-0.058	0.180		0.280	0.166	*	0.346	0.166	**
Mass Point 1 Benefits	-1.334	0.936		-2.230	0.715	***	-1.010	0.460	**	-1.720	0.385	***	-3.829	0.946	***
Mass Point 2 Benefits	1.216	0.508	**	0.554	0.453		0.502	0.286	*	1.430	0.251	***	3.430	0.309	***
Mass Point 1 Empl	0.009	1.198		7.365	3.128	**	-3.650	0.711	***	-3.760	0.630	***	-2.177	0.339	***
Mass Point 2 Empl	3.200	0.399	***	3.154	0.311	***	2.027	0.179	***	2.515	0.202	***	0.366	0.149	***
Prob	0.319	0.335	**	0.627	0.275	*	0.374	0.275	*	0.269	0.175	***	0.768	0.239	***
Log-Likelihood	-1418.29			-2095.33			-5328.32			-7149.08			-10196.66		

	Ireland			Italy			Portugal			Spain			UK		
Unemployment	Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.	
Reveiving Benefits	-0.525	0.130	***	-0.207	0.116	*	-1.031	0.176	***	-0.358	0.067	***	-0.344	0.111	***
Duration Dependence															
Duration 6-12 Months	-0.010	0.133		-0.097	0.080		-0.107	0.135		-0.115	0.059	*	-0.507	0.137	***
Duration 12-24 Months	-0.538	0.176	***	-0.862	0.118	***	-0.544	0.195	***	-0.756	0.086	***	-0.612	0.147	***
Duration 24+ Months	-1.146	0.273	***	-1.399	0.157	***	-0.795	0.279	***	-1.307	0.125	***	-1.818	0.228	***
Employment															
Reveiving Benefits (RB)	-0.065	0.207		-0.404	0.101	***	0.256	0.215		-0.422	0.064	***	-0.364	0.177	**
Un. Duration (1-6 Months)	-0.300	0.248		-0.138	0.127		-0.654	0.269	***	-0.080	0.087		-0.032	0.206	
Un. Duration (7-12 Months)	-0.305	0.233		0.207	0.125	*	-0.233	0.274		-0.037	0.095		-0.524	0.296	*
Duration Dependence															
Duration 6-12 Months	1.902	0.270	***	1.090	0.085	***	0.521	0.137	***	0.565	0.063	***	1.121	0.213	***
Duration 12-24 Months	2.112	0.336	***	0.321	0.160	**	0.697	0.160	***	0.077	0.103		2.475	0.304	***
Duration 24+ Months	2.767	0.379	***	0.772	0.187	***	1.361	0.250	***	0.558	0.118	***	3.039	0.368	***
Unobs. Heterogeneity															
Mass Point 1 Unem	-3.468	0.825	***	-3.237	0.286	***	-3.740	0.425	***	-3.295	0.183	***	-2.496	0.373	***
Mass Point 2 Unem	0.209	0.198		0.753	0.118	***	-1.728	0.342	***	0.297	0.101	***	-0.001	0.207	
Mass Point 1 Benefits	0.407	0.635		-6.409	0.792	***	-1.936	0.428	***	-3.233	0.352	***	-1.970	0.520	***
Mass Point 2 Benefits	0.214	0.396		3.522	0.470	***	0.157	0.472		1.822	0.216	***	0.706	0.345	**
Mass Point 1 Empl	-2.553	0.922	***	-2.723	0.260	***	-3.283	0.825	***	-1.911	0.241	***	-4.290	0.510	***
Mass Point 2 Empl	3.352	0.309	***	0.937	0.162	***	-1.595	0.350	***	1.093	0.081	***	3.138	0.276	***
Prob	0.610	0.227	**	0.679	0.202	***	0.792	0.267	***	0.598	0.198	**	0.467	0.211	
Log-Likelihood	-2523.32			-11787.0			-3984.53			-22344.77			-2908.81		

Notes: ***,**,and * denote significance at the 1%, 5%, and 10% level, respectively. The model is jointly estimated with two mass points for each process. The reported second mass point denotes the deviation from the first mass point. Estimation includes all other regressors as in Table 4 and 5 and year dummies. These coefficients are reported in Table A.2 in the Appendix.

Table 9. Employment Hazard Estimates with Interaction for Benefits and Previous Unemployment Duration.

	Belgium			Denmark			France			Germany			Greece		
Employment	Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.	
Reveiving Benefits (RB)	-2.084	0.829	***	-0.284	0.720		-0.583	0.252	**	-0.223	0.312		-0.084	0.289	
RB * Un Dur (1-6 Months)	1.146	0.814		-0.377	0.767		0.168	0.307		0.014	0.321		-0.094	0.276	
RB * Un Dur (7-12 Months)	0.145	0.880		-0.693	1.015		0.741	0.429	*	-1.232	0.399	***	0.081	0.336	
Un. Duration (1-6 Months)	-2.875	0.795	***	-1.196	0.552	**	-0.022	0.219		-0.057	0.263		0.028	0.176	
Un. Duration (7-12 Months)	-2.972	0.882	***	0.616	0.784		-0.132	0.251		0.893	0.358	***	-0.020	0.196	
Duration Dependence															
Duration 6-12 Months	0.889	0.261	***	1.573	0.231	***	0.890	0.140	***	1.103	0.107	***	1.224	0.073	***
Duration 12-24 Months	2.479	0.384	***	2.251	0.348	***	1.240	0.209	***	1.465	0.160	***	0.146	0.126	
Duration 24+ Months	3.223	0.627	***	2.596	0.418	***	1.880	0.249	***	2.725	0.258	***	0.415	0.152	***
Unobs. Heterogeneity															
Mass Point 1 Unem	-4.321	0.852	***	-2.146	0.764	***	-4.656	0.408	***	-4.605	0.288	***	-3.052	0.359	***
Mass Point 2 Unem	0.090	0.308		0.279	0.222		-0.058	0.171		0.276	0.165	*	0.344	0.166	**
Mass Point 1 Benefits	-0.855	0.886		-2.233	0.715	***	-0.985	0.458	**	-1.689	0.394	***	-3.783	0.946	***
Mass Point 2 Benefits	0.616	0.482		0.559	0.456		0.484	0.264	*	1.404	0.267	***	3.421	0.308	***
Mass Point 1 Empl	2.505	1.512	*	7.218	3.141	**	-3.730	0.651	***	-3.818	0.657	***	-2.207	0.352	***
Mass Point 2 Empl	3.035	0.394	***	3.140	0.313	***	2.020	0.167	***	2.503	0.203	***	0.371	0.149	**
Prob	0.329	0.346	**	0.627	0.275	*	0.385	0.227	**	0.282	0.182	***	0.771	0.243	***
Log-Likelihood	-1420.050			-2095.040			-5326.110			-7142.490			-10196.070		

	Ireland			Italy			Portugal			Spain			UK		
Employment	Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.	
Reveiving Benefits (RB)	-0.335	0.446		0.289	0.275		-0.003	0.654		-0.441	0.162	***	-0.427	0.292	
RB * Un Dur (1-6 Months)	0.221	0.519		-0.811	0.276	***	0.538	0.664		-0.018	0.173		0.326	0.356	
RB * Un Dur (7-12 Months)	1.235	0.642	*	-0.514	0.307	*	0.043	0.748		0.122	0.191		-0.573	0.602	
Un. Duration (1-6 Months)	-0.183	0.448		0.033	0.140		-0.733	0.269	***	-0.075	0.116		-0.360	0.240	
Un. Duration (7-12 Months)	-0.919	0.538	*	0.290	0.141	**	-0.240	0.275		-0.097	0.130		-0.584	0.362	
Duration Dependence															
Duration 6-12 Months	2.004	0.289	***	1.096	0.087	***	0.521	0.137	***	0.568	0.063	***	0.974	0.204	***
Duration 12-24 Months	2.368	0.357	***	0.313	0.163	*	0.718	0.161	***	0.083	0.105		2.693	0.328	***
Duration 24+ Months	3.048	0.409	***	0.760	0.187	***	1.392	0.249	***	0.563	0.121	***	3.285	0.390	***
Unobs. Heterogeneity															
Mass Point 1 Unem	-3.476	0.821	***	-3.221	0.286	***	-3.740	0.425	***	-3.296	0.183	***	-2.507	0.377	***
Mass Point 2 Unem	0.108	0.196		0.739	0.119	***	-1.739	0.336	***	0.297	0.101	***	0.020	0.214	
Mass Point 1 Benefits	0.386	0.637		-6.383	0.786	***	-1.933	0.427	***	-3.215	0.349	***	-1.971	0.531	***
Mass Point 2 Benefits	0.243	0.384		3.535	0.466	***	0.138	0.457		1.808	0.218	***	0.650	0.352	*
Mass Point 1 Empl	-4.633	0.977	***	-2.803	0.262	***	-3.211	0.838	***	-1.908	0.247	***	-5.037	0.508	***
Mass Point 2 Empl	3.582	0.335	***	0.898	0.173	***	-1.627	0.388	***	1.096	0.083	***	3.265	0.298	***
Prob	0.577	0.222		0.692	0.200	***	0.792	0.263	***	0.598	0.205	**	0.419	0.215	
Log-Likelihood	-2519.560			-11779.690			-3983.470			-22343.690			-2904.960		

Notes: ***,**,and * denote significance at the 1%, 5%, and 10% level, respectively. The model is jointly estimated with two mass points for each process. The reported second mass point denotes the deviation from the first mass point. The estimates for the unemployment hazard, the benefit selection are not reported as they are similar to Table A.2 in the Appendix.

Table 10. Expected Unemployment and Employment Duration (in months).

	Belgium		Denmark		France		Germany		Greece	
	Type A	Type B	Type A	Type B	Type A	Type B	Type A	Type B	Type A	Type B
Unemployment										
All Unemployed	10.86	10.74	8.97	8.80	11.34	11.37	13.91	13.77	7.81	7.58
Recipients	12.71	12.60	10.75	10.58	14.10	14.14	17.51	17.35	7.37	7.16
Non-Recipients	8.10	7.99	5.29	5.14	7.69	7.72	6.99	6.85	7.96	7.72
Employment										
All Employed	21.51	15.08	13.34	6.81	18.92	14.08	23.20	20.37	15.83	15.24
Recipients	21.35	16.83	13.37	6.57	20.00	15.38	23.59	20.95	12.97	12.56
Non-Recipients	21.73	12.62	13.27	7.37	17.55	12.42	22.74	19.21	16.88	16.23
Employed by Previous Unemployment Duration										
All Employed										
UD 1-6 Months	24.78	16.97	15.06	8.28	19.78	14.31	24.89	21.49	15.71	15.12
UD 7-12 Months	17.80	13.71	7.69	3.21	17.52	12.81	22.75	20.19	16.56	15.96
UD 12+ Months	13.54	9.57	10.24	2.57	17.97	14.55	18.57	16.76	15.22	14.69
Recipients										
UD 1-6 Months	25.78	20.12	15.07	8.17	21.18	15.98	25.68	22.55	13.14	12.72
UD 7-12 Months	19.87	16.92	8.22	3.57	18.32	13.90	23.88	21.42	14.12	13.71
UD 12+ Months	17.20	9.64	12.05	2.94	19.02	15.45	18.89	17.10	9.68	9.36
Non-Recipients										
UD 1-6 Months	23.78	13.86	15.02	8.49	18.34	12.65	23.90	20.16	16.75	16.10
UD 7-12 Months	14.62	8.71	4.71	1.25	16.33	11.17	18.77	15.83	17.14	16.50
UD 12+ Months	12.95	9.14	2.32	0.99	15.93	12.82	15.73	13.76	17.30	16.65

	Ireland		Italy		Portugal		Spain		UK	
	Type A	Type B	Type A	Type B	Type A	Type B	Type A	Type B	Type A	Type B
Unemployment										
All Unemployed	9.74	9.60	10.55	10.03	11.94	12.67	8.68	8.49	10.49	10.49
Recipients	11.17	11.03	7.88	7.49	21.61	22.23	10.71	10.52	12.98	12.98
Non-Recipients	6.34	6.21	11.23	10.69	8.42	9.18	7.23	7.03	9.16	9.16
Employment										
All Employed	22.55	15.63	16.03	14.97	20.10	15.53	15.75	15.03	25.58	13.98
Recipients	21.85	15.44	13.61	12.91	22.16	15.77	16.50	15.90	25.04	14.84
Non-Recipients	24.08	16.06	16.72	15.56	19.55	15.47	15.21	14.40	25.86	13.54
Employed by Previous Unemployment Duration										
All Employed										
UD 1-6 Months	24.04	16.42	16.19	15.21	19.70	15.81	16.05	15.28	26.35	13.94
UD 7-12 Months	21.06	14.93	15.59	14.38	21.43	15.95	14.12	13.52	25.73	16.58
UD 12+ Months	19.75	14.03	16.11	14.95	19.98	14.08	17.12	16.43	22.93	11.93
Recipients										
UD 1-6 Months	22.31	15.64	12.86	12.26	19.87	14.94	15.68	15.22	24.56	12.47
UD 7-12 Months	21.83	15.62	12.74	11.98	25.49	17.92	14.70	18.96	22.39	9.19
UD 12+ Months	20.80	14.69	19.36	18.18	22.11	15.22	18.32	15.21	24.36	11.45
Non-Recipients										
UD 1-6 Months	26.52	17.54	17.27	16.16	19.68	15.92	15.90	15.04	26.80	13.72
UD 7-12 Months	17.24	11.52	16.24	14.94	20.10	15.30	13.21	12.55	25.92	16.14
UD 12+ Months	15.28	11.21	15.37	14.21	17.80	12.91	14.97	14.22	21.02	10.32

Notes: Mean Durations are computed using the estimated coefficients from the joint model with correlated unobserved heterogeneity of Table 8 distinguishing by the types identified by unobserved heterogeneity.

Appendix

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

	Schemes	Employment/contributions conditions	Payment rate	Duration (months)
Belgium	Insurance	312 days in 18 months rising to 624 days in last 3 years depending on age	60 for singles and 55 for cohabitants declining to 44 and 35 after 1st year	No limit
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
Portugal	Insurance	540 days in 2 years	65% of reference wage	12-30 months depending on age
	Assistance	180 days in 1 year	100% of minimum wage	12-30 months depending on age
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 A.2. Unemployment, Benefit Selection Equation, and Employment Hazard Estimates with Unobserved Heterogeneity.

	Belgium			Denmark			France			Germany			Greece		
Unemployment	Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.	
High Education	0.303	0.236		-0.143	0.178		0.159	0.126		0.505	0.130	***	-0.025	0.110	
Secondary Education	0.097	0.215		-0.083	0.154		0.327	0.097	***	0.310	0.098	***	-0.083	0.085	
Age 20-24	1.898	0.447	***	0.124	0.278		1.884	0.239	***	1.194	0.170	***	0.331	0.173	*
Age 25-29	1.917	0.426	***	0.633	0.241	***	1.790	0.231	***	1.320	0.155	***	0.465	0.153	***
Age 30-39	1.932	0.407	***	0.730	0.210	***	1.633	0.223	***	1.308	0.136	***	0.531	0.144	***
Age 40-49	1.658	0.417	***	0.621	0.234	***	1.507	0.225	***	1.014	0.137	***	0.275	0.136	**
Married	0.432	0.189	**	0.032	0.161		0.164	0.119		0.203	0.101	**	0.302	0.134	**
Number of Kids	-0.053	0.089		0.044	0.079		0.047	0.044		0.035	0.042		0.058	0.052	
Spouse Non-Employed	-0.256	0.210		-0.390	0.161	***	0.090	0.110		-0.174	0.093	*	0.061	0.100	
Regional Unem. Rate	-0.031	0.031		-0.148	0.119		-0.007	0.017		0.018	0.010	*	-0.026	0.022	
Benefit Equation															
High Education	-0.377	0.403		0.449	0.355		-0.328	0.199	*	-0.241	0.228		-0.393	0.450	
Secondary Education	-0.359	0.358		0.143	0.290		0.156	0.162		-0.083	0.167		0.230	0.318	
Age	0.003	0.017		0.020	0.013		0.024	0.008	***	0.022	0.007	***	0.007	0.017	
Married	-0.112	0.335		0.086	0.313		-0.290	0.198		-0.087	0.186		0.896	0.540	*
Number of Kids	-0.400	0.150	***	0.121	0.147		0.060	0.073		0.098	0.079		0.004	0.176	
Spouse Non-Employed	0.719	0.383	*	0.138	0.298		0.194	0.182		0.091	0.168		-0.135	0.335	
Regional Unem. Rate	0.103	0.048	**	0.194	0.049	***	0.014	0.026		0.049	0.018	***	0.047	0.053	

	Ireland			Italy			Portugal			Spain			UK		
Unemployment	Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.	
High Education	0.215	0.200		0.327	0.169	*	0.053	0.325		0.008	0.078		0.245	0.107	**
Secondary Education	0.172	0.123		0.150	0.079	*	0.354	0.190	*	-0.062	0.067		-0.035	0.176	
Age 20-24	0.515	0.234	**	0.244	0.165		0.723	0.231	***	0.704	0.109	***	0.527	0.195	***
Age 25-29	0.465	0.240	*	0.272	0.151	*	0.967	0.227	***	0.710	0.105	***	0.452	0.192	**
Age 30-39	0.342	0.196	*	0.364	0.128	***	0.531	0.204	***	0.638	0.095	***	0.302	0.187	
Age 40-49	0.242	0.191		0.297	0.127	**	0.592	0.201	***	0.541	0.098	***	0.175	0.179	
Married	0.248	0.193		0.460	0.125	***	0.136	0.151		0.161	0.080	**	0.176	0.133	
Number of Kids	0.039	0.049		0.057	0.044		0.122	0.055	**	-0.017	0.028		-0.075	0.052	
Spouse Non-Employed	-0.106	0.163		-0.049	0.094		0.060	0.149		0.124	0.073	*	-0.273	0.130	**
Regional Unem. Rate	0.014	0.059		-0.018	0.004	***	0.041	0.019	**	0.003	0.004		-0.028	0.021	
Benefit Equation															
High Education	-1.046	0.358	***	0.429	0.459		-0.403	0.676		-0.064	0.181		-0.122	0.199	
Secondary Education	-0.123	0.236		0.301	0.247		0.289	0.293		-0.218	0.155		-0.125	0.325	
Age	-0.016	0.012		0.059	0.015	***	0.035	0.010	***	0.027	0.007	***	0.019	0.010	*
Married	-0.178	0.342		0.895	0.392	**	0.762	0.257	***	0.801	0.175	***	-0.312	0.252	
Number of Kids	0.073	0.098		0.374	0.145	***	-0.065	0.091		0.021	0.066		0.011	0.090	
Spouse Non-Employed	0.700	0.310	**	-0.600	0.302	**	-0.227	0.238		0.102	0.162		0.518	0.237	**
Regional Unem. Rate	0.079	0.039	**	-0.002	0.011		-0.089	0.033	***	0.031	0.009	***	0.046	0.032	

Table A.2. Unemployment, Benefit Selection Equation, and Employment Hazard Estimates with Unobserved Heterogeneity (cont).

	Belgium			Denmark			France			Germany			Greece		
Employment	Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.	
High Education	0.071	0.378		0.147	0.269		0.362	0.207	*	-0.154	0.190		-0.264	0.113	**
Secondary Education	-1.312	0.292	***	0.555	0.231	**	0.411	0.167	***	-0.093	0.125		0.146	0.078	*
Age 20-24	0.253	0.662		0.521	0.465		1.262	0.384	***	0.146	0.250		-0.266	0.167	
Age 25-29	-0.560	0.691		-0.225	0.363		0.529	0.516		0.042	0.178		0.103	0.147	
Age 30-39	1.069	0.609	*	0.131	0.333		0.580	0.406		-0.116	0.176		-0.045	0.129	
Age 40-49	0.146	0.653		0.334	0.317		0.123	0.408		0.076	0.170		0.070	0.114	
Married	-0.017	0.324		0.301	0.277		0.199	0.205		-0.341	0.150	**	-0.132	0.134	
Number of Kids	-0.324	0.120	***	0.776	0.118	***	-0.166	0.091	*	0.156	0.058	***	0.031	0.047	
Spouse Non-Employed	-0.341	0.302		-0.328	0.227		0.492	0.169	***	-0.144	0.139		0.140	0.090	
Full Time Job	-1.446	0.418	***	-1.708	0.425	***	0.563	0.157	***	-0.772	0.167	***	-0.113	0.119	
Regional Unem. Rate	0.128	0.039	***	-2.092	0.592	***	0.031	0.049		0.022	0.014		0.023	0.022	
Log-Likelihood	-1418.29			-2095.33			-5328.32			-7149.08			-10196.66		

	Ireland			Italy			Portugal			Spain			UK		
Employment	Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.	
High Education	0.578	0.329	*	0.308	0.196		2.278	0.769	***	0.004	0.115		-0.628	0.158	***
Secondary Education	-0.117	0.190		-0.092	0.085		0.072	0.223		-0.030	0.086		-1.201	0.280	***
Age 20-24	0.653	0.346	*	0.242	0.192		-0.156	0.255		-0.081	0.127		0.856	0.283	***
Age 25-29	0.534	0.364		0.083	0.161		0.377	0.251		-0.242	0.118	**	0.849	0.274	***
Age 30-39	0.911	0.289	***	0.030	0.125		0.133	0.214		-0.203	0.107	*	0.619	0.252	***
Age 40-49	0.871	0.286	***	0.031	0.119		0.151	0.230		-0.041	0.103		0.365	0.279	
Married	-0.368	0.246		0.333	0.136	***	-0.171	0.178		0.006	0.102		0.698	0.201	***
Number of Kids	0.239	0.082	***	-0.068	0.050		0.212	0.056	***	0.071	0.038	*	-0.017	0.089	
Spouse Non-Employed	-0.805	0.245	***	-0.131	0.096		-0.036	0.187		-0.159	0.098		-0.119	0.229	
Full Time Job	0.167	0.171		0.078	0.111		0.118	0.227		-0.194	0.090	**	-0.900	0.233	***
Regional Unem. Rate	-0.134	0.102		0.015	0.004	***	0.121	0.025	***	0.024	0.005	***	-0.053	0.031	*
Log-Likelihood	-2523.32			-11787.0			-3984.53			-22344.77			-2908.81		

Notes: ***,**,and * denote significance at the 1%, 5%, and 10% level, respectively. The estimates are obtained from the jointly estimated model with correlated unobserved heterogeneity. The main results are reported in Table 8.