New Evidence on State Dependence in Unemployment Histories[*].

José M. Arranz and Juan Muro[a].

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Abstract.

Using administrative data records from the Spanish Employment Agency we examine whether or not there is evidence of state dependence in unemployment under benefits in Spanish young workers. For this fact, we use a mixed proportional hazard model that allows for state dependence through lagged duration dependence in order to disentangle the effects of unobserved individual heterogeneity and the true state dependence. We have found evidence that past unemployment experience and unobserved individual components affect the experience of longer future unemployment spells under benefits. However, we appreciate in workers with completed past unemployment spells that the correlation between the duration of succesive unemployment spells is only due to the unobserved components across individuals. Besides, we observe that workers in their second unemployment experience under benefits present higher hazard rates that in their first unemployment experience under benefits.

JEL classification: J64.
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[a] Departamento de Fundamentos de Economia e Historia Economica. Universidad de Alcala, Alcala de Henares 28803, Spain, e-mail: ehjmr@funeco.alcala.es. ehjmam@funeco.alcala.es.

1. Introduction.

Since James Heckman and George Borjas first raised the question in 1980, does unemployment cause future unemployment? A few authors become to study this issue which yet nowadays comes to no absolutely firm conclusions about the existence of state dependence. In the economic literature, two types of state dependence have been offered to interpret this phenomenon: the spurious and the true state dependence. The spurious state dependence argues that individuals differ in unobserved characteristics and these differences affect the experience of longer spells of unemployment in the future. However, these individuals are unaffected by the mere experience of unemployment. Under the true state dependence, the prior unemployment experience has a genuine behavioral effect in the sense that an identical individual who did not experience unemployment would behave differently in the future than an individual who experienced unemployment. Thus workers with longer periods of unemployment reduce their future employability because they lose work experience or human capital while are unemployed, or because potential employers infer the unobserved components of the workers quality from their history of employment and unemployment (Vishwanath (1989), Lockwood (1991), Omori (1996)). Alternativility, workers may decrease their reservation wage while are unemployed, and accept bad jobs that are more likely to be destroyed, and increase the probability to experiment future unemployment spells.

There are not many studies that have studied the state dependence and even provide inconclusive evidence over their causes. On the one hand, there are works that do not find evidence that past unemployment causes future unemployment and the correlation between the duration of successive unemployment reflects heterogeneity across individuals. A given individual enjoys the same chance of reemployment no matter how long or short these periods of past unemployment have been. For example, Heckman and Borjas (1980) with US data from the National Longitudinal survey (NLS) 1969-1971 for 122 young men graduated from high school in 1969, include measures of past nonemployment as regressors in a model of observed nonemployment spell and do not find evidence that past unemployment cause future unemployment. Lynch (1985) uses a sample from a longitudinal survey of young people living in London who were unemployed one year (April 1980) after leaving school, includes measures of past unemployment as covariates in a reemployment hazard model of observe unemployment and does not find evidence of true state dependence. On the another

hand, Lynch (1989) and Trivedi and Alexander (1989) affirm that there is true state dependence. Lynch (1989) using a similar approach that in her previous paper with a cohort of youths not employed of the NLS, reports no or negative effects of past nonemployment in the reemployment probability, depending on the assumption about the distribution of nonemployment spells. Trivedi and Alexander (1989) with a Cox's partial likelihood approach and a sample of 2.402 individuals obtained from the Australian National Longitudinal Survey (ANLS), support the hypothesis that the duration of previous unemployment is an important determinant of reemployment probability. Finally, authors as Omori (1997) suggests that both types of state dependence exist. The true and the spurious state dependence. He estimates a semiparametric maximum likelihood estimator controlling the observed and unobserved heterogeneity for a cohort of 2.184 young men taken from the NLS and finds that the unobserved heterogeneity and the past experience in nonemployment influence in the duration of future nonemployment spells[1].

There are some reasons why theses studies may fail to identify the importance of the unobserved heterogeneity components and the past experience in unemployment to explain the duration of the future unemployment spells. First, the hazard models can incorporate time varying covariates and Lynch (1985,1989) does not incorporate them into the hazard models. Second, Trivedi and Alexander (1989) do not control for the effect of the unobserved heterogeneity characteristics and only focus on the study of the work history. Third, to assume a parametric distribution on the nonemployment duration may affect the maximum likelihood estimates. Thus, Lynch (1989) reports not or negative effect of the past unemployment when assumes a log logistic and weibull distribution, respectively. Fourth, Heckman and Borjas (1980) use a small sample that make them difficult to detect the effect of the past nonemployment duration on the reemployment hazard. Fifth, Lynch (1985,1989) includes the current unemployment duration in the hazard model and may provoke inconsistent maximum estimations because there is a correlation between the unobserved heterogeneity component and the past unemployment duration. Finally, neither of the authors mentioned above do not estimate simultaneously the hazard model for the past and present unemployment spells that is essential to control the possible spurious state dependence between unemployment spells.

[1] Omori(1996) developed a method for distinguishing between the effects of stigma and human capital decay as a true state dependence explanation.

The objective of the current study is to participate in the discussion[2] about the causes of the unemployment state dependence. In particular, we shall investigate whether or not there is evidence of state dependence for the Spanish youth unemployed that perceive benefits. In our empirical analysis we utilize a longitudinal database that comes from administrative records contained in the Historical Integrated Benefits System (HSIPRE, Histórico del Sistema Integrado de Prestaciones) collected by the Spanish Employment Agency (INEM, Instituto Nacional de Empleo). The richer nature of the data set used, both in terms of sample size and information available on each individual, allow us to obtain some Spanish novel results and to provide additional evidence on the importance of factors investigated in previous studies. We uses a multivariate mixed proportional hazard model that allows for state dependence through lagged duration dependence in order to disentangle the effects of unobserved individual heterogeneity and the true state dependence after controlling for observable characteristics. We estimate the mixed proportional hazard model by the non-parametric maximum likelihood estimator of Heckman and Singer (1984). This analysis tries overcome many of the problems of the existing literature mentioned above. We do not make assumption on the distribution of the unemployment duration, we incorporate time varying covariates, we let the unobserved heterogeneity correlated across spells and we estimate simultaneously two unemployment spells under benefits.

The paper is organized as follows. In the next section we briefly describe the Spanish Unemployment Compensation System. In section 3, we present the data. The model and the likelihood function in section 4. The variables and empirical results in section 5. Finally, we summarize our findings in the last section with the conclusions. Our findings suggest that as much the past unemployment experience as unobserved heterogeneity explain the influence of past unemployment duration on the length of future unemployment spells. However, we appreciate in workers with completed past unemployment spells that the correlation between the duration of succesive unemployment spells is due to the unobserved components across individuals. Besides,

[2] Most work in this area has investigated state dependence durations with panel data. Narendranathan and Elias (1993) find strong evidence of true state dependence in unemployment occurrence for a cohort of young British men aged 23 in 1981. Flaig et al. (1993) and Muhleisen and Zimmerman (1994), using the first 6 waves of the German Socio economic Panel, find strong evidence of true state dependence for men during 1984 in both studies. Arulampalam et al. (1993) with the first five waves of the British Household Panel Survey for the period 1991-95 find strong evidence especially for mature men (defined as those aged 25 over 1991) and less evidence for younger men.

we see evidence that workers in their second unemployment experience under benefits present higher hazard rates that in their first unemployment experience under benefits.

2. The Spanish Unemployment Compensation System.

Before carrying out our analysis, it appears convenient to present concisely the main features of the Spanish Unemployment Compensation System (SIPRE, Sistema de Prestaciones por Desempleo). As in most OECD countries, there are basically two types of benefits in Spain: unemployment insurance (UI) and unemployment assistance (UA). An unemployed that loses a job and has a minimum contribution period of 6 months during the last 48 months receives unemployment insurance[3]. The entitlement duration is calculated by dividing by 2 the number of months contributed, with the constraints that the result has to be an integer multiple[4] of 2. As for the level of income provided for the unemployed, it was determined by multiplying the gross replacement rate by the average of the "regulatory base" (i.e. the wage base used to calculate contributions and equal in principle to total wages) in the six months before entering unemployment. The monthly amount receive is the 80 per cent during the first six months of benefits (70 per cent after 1992) of the previous 6 monthly wage, the 70 per cent from the seventh to the twelfth month (60 per cent after 1992) and the 60 per cent from the thirteenth month onwards (60 per cent after 1992). Unemployment insurance are also subject to a floor equal to the statutory minimum wage (SMW) and a ceiling equal to 170 per cent of the SMW, which could be increased to 190 and 220 percent if the unemployed person have one child or more than one dependent children. These two factors implied that the "net" (i.e. after-tax) replacement rate could be much higher than the gross rates above, the difference being dependent upon the actual wages received while working. Since 1994 the minimum has been reduced to 75% of the SMW unless the recipient has dependent children in which case it is still 100 % of the SMW.

For those who have worked but not enough for unemployment insurance, or who have exhausted their insurance benefit, unemployment assistance is available[5].

[3] Since 1992 a minimum of 12 months must have been worked during the last 72 months in order to receive any benefits.
[4] After 1992, the duration is calculated by dividing by 3 the number of months contributed, with the same constraint than before 1992.
[5] Workers having contributed less than 6 months in pre-1992 period or 12 months in post-1992 period were not entitled to unemployment insurance but they could claim unemployment assistance if they had contributed at least 3 months.

Unemployment assistance payments have no relation with the previous monthly wages. A family income criterion was also used whereby per capita family income could not exceed the SMW. A flat benefit equal to 75 per cent of the SMW was paid to all beneficiaries. Since 1993, these criteria have been tightened, as the notion of family has been restricted and the per member income requirement lowered to 75% of the SMW. In table 1 we show the entitlement duration benefits according to the period of contribution.

3. The data set.

Our sample set consists of a random sample drawn from the HSIPRE (Historico del Sistema de Prestaciones por Desempleo) data set that contains information on registered unemployed that receives all types of unemployment benefits from the Spanish Employment Agency (INEM). It registers claims of insurance and assistance benefits by all fully unemployed workers as well as some of those partially unemployed (i.e. on short time work). The advantage of the HSIPRE data is accurate information on days of unemployment insurance and assistance receipts, pre unemployment earnings, level of benefits, potential duration of benefits over time and information on several unemployment spells for the same individual. The importance of exact data is highlighted by the large agree of measurement error that has been found in the weeks unemployed variable in some household surveys. Additionally, the unemployment insurance and unemployment assistance parameters, level of benefits and duration are often missing from other data sources, for example the Spanish Labour Force (EPA, Encuesta de Poblacion Activa). Our data provides precise information on these key variables. The disadvantage of the data is that is not possible to determine the labour force status in the days after insurance and assistance benefits are exhausted and unfortunately, does not include information about marital status, industry and size of the firm in the previous job.

To evaluate whether or not there is unemployment state dependence under benefits we consider a sample of young workers with age between 18 and 35 years old (greater than or equal to 18 and less than or equal to 35), that enter to the Spanish Unemployment Compensation System and experience one or two unemployment spells under benefits during January 1984 and December 1991. Furthermore, we consider the

insurance and assistance part of the system, but we only consider assistance benefits when individuals exhausted their insurance benefits[6]. This sample restricts our total sample to be a set of the unemployment prone people under 35, so increase our information on the determinants of unemployment under benefits dependence and to reduce the effect of the error in initial conditions. As one of the criticism to the paper could be the problem of censoring in the study of lagged duration dependence, we have created an additional sample that contains workers with a completed past unemployment spell, because we do not know the true lagged duration but only a minimum level of it. In other words in this completed past unemployment sample we do not include workers who experience two unemployment spell and exhausted their benefits during the first unemployment spell. After making the sample selection described we have two samples: an entire sample and a completed past unemployment sample. The entire sample contains information of 175.103 workers who experience one unemployment spells and from these workers 69.782 have a second unemployment spell. In the completed past unemployment sample there are 131.002 workers who experience one unemployment spell and from these workers 25.681 had another second unemployment spell under benefits whose first unemployment spell was not exhausted. Background variables like age, gender, family burdens, information about the Unemployment Compensation System, job category and the wages in the last job are registered at the beginning of the spell. Characteristics for the individuals are reported in table 2 and 3.

We observe that the unemployment entitlement spells are concentrated in periods less that 6 months in both samples. In the entire sample (we comment the completed past unemployment sample in brackets) the 55.2 per cent (45.3 per cent) of the workers have entitlement spells less than 6 months during their first unemployment spell and the 59.1 per cent (50.6 per cent) during their second unemployment spell under benefits. The average duration is approximately 270 days (302 days) for the unemployed in the first unemployment spell and 192 days (189 days) in the second unemployment spells under benefits. The entitlement duration is roughly 354 (415 days) and 285 days (321 days) in the first and second unemployment spell respectively. The lagged duration is 173 days in the entire sample and 171 days in the completed past unemployment sample.

[6] In future studies we will deal assistance benefits of workers who having contributed less than 6 months (12 months after 1992) were not entitled to UI benefits buy they could claim UA if they had contributed at least 3 months.

The average unemployed age that first enters to the unemployment compensation system is around 25 years old and recurrences with 26 (27 years old) years old. We appreciate that workers with a completed past unemployment spell under benefits remained longer periods in employment because they had their second unemployment spell with an older age. They pass from and average wage in the last employment of 67 (69 thousand ptas per month) thousand pesetas per month in the first unemployment spell to 74 (78 thousand ptas per month) thousand pesetas per month during the second unemployment spell. The level of benefits is 61 (62) and 67(69) thousand pesetas per month in the first and second occurrence in unemployment under benefits, respectively.

Concerning to the exit from the unemployment compensation system, the 64.5 per cent (52.6 per cent) exhausted their benefits in the first unemployment spell and the 58.6 per cent (44.1 per cent) in the second unemployment spell. Finally, we observe that the samples contain a high percentage of workers without family burdens and whose cause of unemployment was the end of the contract. Thus, the 87 per cent (85 per cent) have not family burdens in the first unemployment spell and the 78 (75 per cent) during the second unemployment spell. Regards the cause of unemployment, around the 97 and 98 per cent enter to the unemployment compensation system by the end of the contract.

Finally, to study in depth the patterns of months and the behaviour of the unemployed we present two additional analyses. First, we show the habitual empirical hazard through Kaplan Meier estimation in figures 1 and 2. Figure 1 gives the empirical hazard of workers who experience one or two unemployment spells under benefits and figure 2 the empirical hazard of workers who experience one or two unemployment spell under benefits and had a completed past unemployment spell. In both figures there are several periods where the empirical hazard is noticeably higher than surrounding periods. There is a high hazard in the first months, until approximately six months, probably caused by the high concentration of short entitlement period mentioned above. There are jumps in multiple of three months probably caused by benefits exhaustion. We observe a positive duration dependence during the first periods and after that there is a negative duration dependence, this means that the exit rate increase at the beginning with the unemployment duration and decrease after a maximum being longer the unemployment duration. This suggests the need to include a flexible baseline hazard to model the unemployment duration. Finally, we appreciate that workers present higher probability of finding a job in the second unemployment spell than in the first unemployment spell in both figures, and combining the empirical hazard of figure 1 and

2 in figure 3, we observe that workers of the completed past unemployment sample have higher probability of finding a job than workers of the entire sample in the first and second unemployment spell under benefits. These last two points can be explained in the following way. First, workers who experience a second unemployment spell under benefits remain shorter durations in unemployment than workers who experience a first unemployment spell because present more job experience, receive more offers with higher wages and are more attractive for employers. Can be remained that workers, between their first and second unemployment spell experience under benefits, should have worked more than six months and it is like a paid training program that increase their skills habilities and their probability of finding a job. Second, workers in the entire sample present lower empirical hazard rates than workers in the completed past unemployment sample because the entire sample contains higher proportion of workers than exhausted the benefits and remained longer duration in unemployment under benefits.

Finally, we present in tables 4 and 5 an original presentation of the determinants features of the unemployment duration based on the calculus of the gross hazard rates. For a complete illustration of this novel method see Muro (2000). These tables contain in the first column the gross hazard rate from unemployment of an unemployed individual with a specific characteristic under the assumption that the hazard rate is constant along the unemployment duration spells. We define the gross hazard, measures in percentage, as the probability that a worker find a job conditional that has been unemployed until the previous month. In this measurement we do not consider the ceteris paribus condition. In other words, we do not consider the effect that other covariates have over the conditional probability of finding a job. Thus, if the reader wants to obtain the gross hazard rate of an unemployed with more than one characteristic must not be inferred from the tables 4 and 5. The second column presents the standard error associate to the estimator of the first column, and finally the third column shows a relative measure of the hazard rate for each category in a given variable concerning to the hazard rate of whatever individual without a specific characteristic. We will initially present some general results on the gross hazard rate, later we report results of individual and economic variables.

As can be seen, in the first and second spell of workers who experience at least two unemployment spell under benefits in the entire sample, the gross monthly hazard rate of an individual without any specific characteristic, named whatever individual, is

3.93% and 6.46 % in the first and second unemployment spell, respectively. For instance, if we assume that there is a cohort of 100 unemployed individuals who starts the unemployment spell in the same moment. From this cohort, the 3.93 per cent of the individuals find a job monthly in their first unemployment spell and the 6.46 % during their second unemployment spell. Thus, under the assumption of a constant exit rate assumed for the calculus of the gross hazard rate, the 50% of the unemployed individuals remain unemployed 17 months in their first unemployment spell and around 35 months the 90% of the unemployed. In the second unemployment spell the 50% of the workers stay 10 months and the 90% of the unemployed individuals around 21 months. The procedure is the same for the completed past unemployment sample. Thus, the 4.69 % of the individuals find a job monthly in their first unemployment spell and the 8.86 % during their second unemployment spell. We can affirm that the 50% of the unemployed individuals remain unemployed around 15 months in their first unemployment spell and around 29 months the 90%. However, in the second unemployment spell the 50% of the unemployed individuals stay 8 months and approximately 15 months the 90%. As can be observed, with the gross hazard rate procedure we appreciate two important features that we appreciated in figures 1, 2 and 3. Thus, we see that workers in the second unemployment spell under benefits present higher gross hazard rates than in the first unemployment spell in both samples, and workers of the entire sample present lower gross hazard rate than in the completed past unemployment sample because contains higher proportion of workers that exhausted their benefits and remained longer duration in unemployment under benefits. Given that procedure is very simple, from now on we only comment the magnitude of the gross hazard rate. As in both samples, the entire sample and the completed past unemployment sample, the results are very similar, we only focus our comments in the entire sample.

The main conclusions between the gross hazard rate and personal variables as gender, age, job category are the followings. In relation to the variable gender, males present a higher probability of finding a job than females in both spells. Thus, the gross hazard rate of males is 117.66% in males and 76.85% for females in the first spell. In the second spell the gross hazard rate is 129.21% in males and 68.32% in females. Concerning to the job category variables, we observe that workers who present better qualifications as high levels and associate professional technicians, foremen and supervisors have higher probability of finding a job than the rest of workers in both

spells. Thus, the gross hazard rate of these better qualified workers is 186.13 % in the first spell and 146.37% in the second spell. Regards to the variable age, young workers present higher hazard rate from unemployment than old workers. The gross hazard rate of workers in the first spell (we comment the second spell in brackets) with age among 18 and 22 years old is 141.26% (116.74%) in the first spell, the 133.52 % (109.89 %) among 22 and 26 years old, the 91.66% (99.06%) among 26 and 30 years old, the 72.46% (92.54 %) among 30-35 years old and the 17.80% (79.80 %) for workers with more than 35 years old.

Regards to the variables which measures the influence of the labor market conditions and the business cycle over the probability of finding a job in the workers, we have included the quarterly regional unemployment rate, the quarterly GDP rate and the cause of unemployment. We observe that workers who have registered in the unemployment compensation system by the end of the contract have higher exit rate. The percentage of the exit rate is the 102.19 in the first spell and the 100.41% in the second unemployment spell. The distribution of the exit rate of the quarterly regional unemployment rate presents a relation in $\cap$ form. Workers who lives in region with low, intermediate and very high quarterly regional unemployment rate present lower exit rate that workers who live in regions with high quarterly regional unemployment rate. In relation to the exit rate of the quarterly GDP rate, we observe that the exit rate is higher when increase the quarterly GDP rate in both unemployment spells.

In relation to variables that affect the intensity of search as the level of benefits, we observe that benefits present and incentive effect on the exit rate from unemployment. Thus, individuals who receive higher amount of benefits present higher exit rate from unemployment. We appreciate that unemployed individuals who receive more than 100 thousand ptas per month have an gross hazard rate of 476.16% (292.48%) in the second spell as opposite to workers who receive less than 60 thousand ptas month whose exit rate is 75.81% (73.59 % in the second spell).

Concerning to the variables that affect the reservation wage as the wage in the last job, we appreciate that workers who perceived higher wages in the last job have higher gross hazard rate. The exit rate increases gradually when increase the amount of the wage in the last job. Thus, workers who earned more than 150 thousand ptas month in their last job have an gross hazard rate of 223.18 % (184.82% in the second spell), 202.93 % (171.01 %) when earned among 125 and 150 thousand ptas month and

decreases continuously in all the categories until the 77.69% (68.97%) for unemployed whose wages was less than 60 thousand ptas month.

Finally, we observe that workers who experience shorter periods of unemployment under benefits in the first unemployment spell present higher gross hazard rate from unemployment in the second spell. As can be seen, the gross hazard rate is 103.86 % for periods less than 3 months, 113.08 % among 3 and 6 months, and decrease gradually until 36.74% for workers who experienced a length in unemployment of more than 24 months. This result is consistent with the human capital decay theory. Workers with longer experiences in unemployment in the past lose work experience, are less attractive for the employers and have less probability of finding a job.

4. The model.

In the analysis of multiple unemployment spells, the probability of leaving the unemployment in subsequent unemployment spells is affected not only for the choice and the chance that Mortensen and Neuman (1989) mentioned, but also for the possible existence of state dependence between past and current unemployment spells duration. If we model the state dependence between unemployment spells duration exclusively through unobserved heterogeneity then current unemployment spell duration, conditional on observed and unobserved heterogeneity, will be independent of past unemployment spell duration. However, when individual's labour history matters in explaining state dependence we may incorporate in our model the effect of human capital decay through lagged duration dependence. Perhaps the easiest way to do this is to allow the duration of current and past unemployment to lower the mean of the wage offer distribution because the workers have loss of valuable work experience in the unemployment. A decrease in the mean of the offer distribution lowers the reservation wage by less than the change in the mean offer distribution as Lippman and McCall (1976) show. Following the above reasoning we predict that in the presence of human capital decay, the current and lagged unemployment spells duration diminishes the reemployment hazard rate**.**

To study whether there is or not state dependence between past unemployment and future unemployment spells under benefits, we use a continuous[7] mixed proportional model (mph) that allows for lagged duration dependence. The popularity of this models arise from at least three factors: First, these models can easily incorporate economics variables that change over time. Second, hazard models can incorporate incomplete (censored) unemployment spells. Third, these models allow one to examine how the probability of finding a job changes with the duration of the spell. The model is in the class of mph model with multiple spells of a multivariate mph. The identification of mph models has been widely studied in the literature. For single spell models Elbers and Ridder (1982), Heckman and Singer (1984a), Ridder (1990). Extensions for multiple spells and multiple states can be found in Flinn and Heckman (1982, 1983), Heckman and Singer (1984b) and Honoré (1993). We use the following proportional hazard representation for the transition rates from unemployment under benefits

$$h_{ij}(t_{ij} \mid X(t_{ij}),q) = l_{0ij}(t_{ij}) f_{ij}(X'(t_{ij}) b_{ij}) \Phi_{ij}(q) \qquad (1)$$

where t_{ij} is the duration of unemployment state i before exiting to the employment state j. The specification given in equation (1) asserts that the rate of transition from unemployment under benefits i into employment j can be thought of as being influenced by three factors. The function $\lambda_{0ij}(t_{ij})$ is named the baseline hazard function and captures the effect of the time elapsed in the unemployment states on the instantaneous probability of finding a job when all the factors held constant. The function $\phi_{ij}(X'(t_{ij})\beta_{ij})$ express the influence of time invariant and time variant covariates on the rate transition from unemployment state i to employment state j. Finally, the function $\Phi_{ij}(\theta)$ accounts for the effects of unobserved heterogeneity components. All the three functions must be such that $h_{ij}(t_{ij} \mid X(t_{ij}),\theta)$ is non-negative. Using an exponential representation for each function is the simplest way of ensuring this property. Accordingly, we can define

$$l_{oij}(t_{ij}) = \exp\{g_0 + g_1 t_{ij} + g_1 t_{ij}^2\} \qquad (2)$$

[7] Following to Flinn and Heckman (1982, pag. 53), we use a continuos time hazard model and not a discrete hazard model because the principal advantage of continuos time model over discrete time model is that the parameters generating the continuos time model are invariant to the time unit used in empirical

$$f_{ij}(X'(t_{ij})b_{ij}) = \exp\left\{\sum_{k=1}^{K} X'_{ij}(t_{ij})b_{ij}\right\} \quad (3)$$

$$\Phi_{ij}(q) = \exp\{c_{ij}q\} \quad (4)$$

where γ_0, γ_1, γ_2, β_{ij}, c_{ij} are parameters to be estimated, $X_{ij}(t_{ij})$ is a $1\times K$ vector of exogenous variables, β_{ij} is a $K\times 1$ vector of coefficients.[8]

The equation (2) for the baseline hazard function is a very general specification that minimizes the likelihood of having a misspecified model. It contains special cases of the most utilized hazard functions. For example, if $\gamma_{2ij}=0$, corresponds to the hazard function of a Gompertz model. If $\gamma_{1ij}=\gamma_{2ij}=0$ the baseline hazard function would correspond to an exponential distribution. Furthermore, let a positive duration dependence ($\gamma_{1ij}>0$), a initial positive duration dependence eventually followed by negative duration dependence ($\gamma_{1ij}>0$ y $\gamma_{2ij}<0$) as predict Jovanovic (1979) or a negative duration dependence followed by a positive duration dependence ($\gamma_{1ij}<0$ y $\gamma_{2ij}>0$) as predict Meyer (1990). Besides, the empirical hazard analyzed in the previous section suggests to model the effect of the unemployment duration with this type of flexible baseline function.

The effects of the unobserved heterogeneity are captured by the use of the one parameter given in the equation (4). We assume that θ to be fixed across spells for a given worker and to have a distribution G(.) across workers. We also assume θ to be a positive random variable with range $(0,\infty)$. Furthermore, we allow individual heterogeneity components vary across states. Thus, c_{ij} (factor loading) are parameters that represent specific transition intensities between different states that are correlated across spells. For example, unobserved heterogeneity component may have a negative

work. A discrete hazard model is critically dependent for its parameterization and interpretation on the particular time interval on which it is estimated.

[8]The interpretation of β_{ij}, the coefficients of the covariates, is similar to that of a regression model, for each additional unit change in the value of X_{ij} the logarithm of the hazard changes by β_{ij}, ceteris paribus. A more intuitive interpretation is obtained by exponentiation the coefficient and computing the value $\{\exp(\beta_{ij})-1\}\times 100$. The interpretation is that for each unit change in the covariate X_{ij}, the rate of transition The interpretation of β_{ij}, the coefficients of the covariates, is similar to that of a regression model, for each additional unit change in the value of X_{ij} the logarithm of the hazard changes by β_{ij}, ceteris paribus. A more intuitive interpretation is obtained by exponentiation the coefficient and computing the value $\{\exp(\beta_{ij})-1\}\times 100$. The interpretation is that for each unit change in the covariate X_{ij}, the rate of transition from unemployment state i into employment state j into changes by a percentage equal to $\{\exp(\beta_{ij})-1\}$ 100.

or positive correlated effect depending, respectively, on whether or no c_{ij} is negative or positive. Then, allowing the factor loadings to differ across consecutive spells of an event builds in the possibility of state dependence in the distribution of unobservables.

Substituting for $\lambda_{0ij}(t_{ij}),\phi_{ij}(X'(t_{ij})\beta)$ and $\Phi_{ij}(\theta)$ in equation (1), we have the hazard rate

$$h_{ij}(t_{ij}|X(t_{ij}),\theta)=\exp\left(g_{0ij}+g_{1ij}t_{ij}+g_{2ij}t_{ij}^{2}+\sum_{k=1}^{K}X'_{ij}(t_{ij})b_{ij}+c_{ij}q\right) \quad (5)$$

The survival function based on (5) is

$$S_{ij}(t_{ij}\mid X_{ij}(t_{ij}),q)=\exp\left(-\int_{0}^{t_{ij}}l_{0ij}(u)\exp(b'_{ij}X_{ij}(t_{ij})q\,du\right) \quad (6)$$

Moreover, the density function of the exit rate from unemployment under benefits spell i to employment spell j is

$$f_{ij}(t_{ij}\mid X_{ij}(t_{ij}),q)=h_{ij}(t_{ij}\mid X_{ij}(t_{ij}),q)\times S_{ij}(t_{ij}\mid X_{ij}(t_{ij}),q), \quad (7)$$

4.1 The likelihood function and estimation method.

To study whether there is or not state dependence with the samples described in the previous section, we consider two types of likelihood functions, one likelihood function for the entire sample which contain information of workers with one or two unemployment spells under benefits, and another likelihood function for the complete past unemployment sample that include information of workers with one or two unemployment spells and had a completed past unemployment spell. In the entire sample, we may observe until six different components depending on whether the present and the past unemployment spell are completed or not. Thus, there are workers who has only one unemployment spell and quit the system to work (1) or exhaust their benefits (2), workers with two unemployment spells that: may find a job during the first and second unemployment spell under benefits (3) or find a job in the first unemployment spell and exhaust the benefits during the second unemployment spell under benefits (4), exhaust their benefits in the first spell and quit the system to work

during the second unemployment spell (5), or exhaust their first and second unemployment spell under benefits (6). Thus, the correct likelihood function should be, see appendix 1,

$$
\begin{aligned}
L(t_1,t_2,X(t_{ij}),\theta) = \prod_{i=1}^{n} & \left[f(t_{i1}, X(t_{i1}),q)\right]^{d_{i1}} \times \left[S(C_{ti1}, X(t_{i1}),q)\right]^{d_{i2}(1-d_{i1})} \times \\
& \times \left[\left\{f(t_{i2}, X(t_{i2}),q)\right\} \times \left\{f(t_{i1}, X(t_{i2}),q)\right\}\right]^{d_{i3}(1-d_{i1})(1-d_{i2})} \times \\
& \times \left[\left\{S(C_{ti2}, X(t_{i2}),q)\right\} \times \left\{f(t_{i1}, X(t_{i2}),q)\right\}\right]^{(1-d_{i1})(1-d_{i2})(1-d_{i3})} \times \\
& \times \left[\left\{f(t_{i2}, X(t_{i2}),q)\right\} \times \left\{S(C_{ti1}, X(t_{i2}),q)\right\}\right]^{d_{i4}(1-d_{i1})(1-d_{i2})(1-d_{i3})} \times \\
& \times \left[\left\{S(t_{i2}, X(t_{i2}),q)\right\} \times \left\{S(C_{ti1}, X(t_{i2}),q)\right\}\right]^{(1-d_{i1})(1-d_{i2})(1-d_{i3})(1-d_{i4})} \qquad (8)
\end{aligned}
$$

where d_{i1} is a dummy variable that distinguishes uncensored duration of recipients who receive benefits and quit the system to work during their first unemployment spell and disappear of the record for ever. The dummy variable d_{i2} discriminates censored duration of workers who exhaust their insurance benefit and disappear of the record[9]. The dummy variable d_{i3} let separate between uncensored and censored duration of recipients who quit the system to work during the first unemployment spell and find a job or exhaust the benefits during the second unemployment spell. Finally the dummy variable d_{i4} distinguish between uncensored and censored duration of recipients who exhausted their benefits during their first unemployment spell and exhaust the benefit or exit to a job in their second unemployment spell.

The contribution of the first and second component in (8) is the value of the density function and the survival function in the first unemployment spell, $f(t_{i1})$ and $S(C_{ti1})$ respectively. The contribution of the third and fourth component is the product of the density function $f(t_{i2})$ and the density function $f(t_{i1})$, and the survival function $S(t_{ti2})$ and the density function $f(t_{i1})$, respectively. Finally, the fifth and sixth component is the product of the survival function $S(C_{ti2})$ and the survival function $S(C_{ti1})$, and the product of the density function $f(t_{i2})$ and the survival function $S(C_{i1})$, respectively.

In relation to the sample that contain information of workers with a completed past unemployment spell, the likelihood function does not contain the last two components. In other words, this likelihood function does not include workers who exhaust their

[9] We do not know if exit to employment, unpaid unemployment or out of the labor force.

benefits in the first spell and quit the system to work during the second unemployment spell, or exhaust their first and second unemployment spell under benefits. Thus, the likelihood function is

$$L(t_1,t_2,X(t_{ij}),\theta) = \prod_{i=1}^{n}\left[f(t_{i1}, X(t_{i1}),q)\right]^{d_{i1}} \times \left[S(C_{ti1}, X(t_{i1}),q)\right]^{d_{i2}(1-d_{i1})} \times$$
$$\times\left[\left\{f(t_{i2}, X(t_{i2}),q)\right\}\times\left\{f(t_{i1}, X(t_{i2}),q)\right\}\right]^{d_{i3}(1-d_{i1})(1-d_{i2})} \times$$
$$\times\left[\left\{S(C_{ti2}, X(t_{i2}),q)\right\}\times\left\{f(t_{i2}, X(t_{i2}),q)\right\}\right]^{(1-d_{i1})(1-d_{i2})(1-d_{i3})} \qquad (9)$$

For both likelihood functions, the individual contribution to the likelihood function obtained by integrating out θ is

$$L(\varphi, X(t_{ij})) = \prod_{i=1}^{n}\left[\int_{q} L_i(j \mid X(t_{ij}),q)\,dG(q)\right] \qquad (10)$$

where G(θ) is the distribution function for θ and Θ is the range of θ. The parameter estimates are obtained by maximizing the likelihood function across all the periods, and where $\varphi = \{\gamma_{0ij}, \gamma_{1ij}, \gamma_{2ij}, \beta_{ij}, c_{ij}\}$ are permitted to depend on the origin state. This likelihood function allows time varying regressors, right censoring, lagged durations. It solves the left censoring or initial condition problems by assuming that the functional form of the initial duration distribution for each origin state is different from that of the other spells as Heckman and Singer (1984c) proposed. To completed the specification of the likelihood function, we should specify the distribution function G(·) for the unobserved heterogeneity component. In the literature, exist two approaches. One is based in assume parametric distribution for G(·)- for example a gamma distribution- and estimate φ after integrating the likelihood function over all values of θ. This method is the most commonly used but there is a disadvantage that is requiring the knowledge of the appropriate parametric form. If there is an incorrect specification for the G(·) function, the estimates of the effects of duration terms and covariates will be inconsistent, see Heckman and Singer (1984c). These authors propose another approach, that we use in this paper and not require a prior parametric specification for unobserved heterogeneity components. It approximates the unknown probability distribution by a

finite support points, and use the data to determinate the location and the probability mass associated with each support point. The basic procedure is to estimate a model with i points of support, starting with i=1 (which is just a model without heterogeneity), and adding points of support until the estimated model becomes singular. Because of the presence of an intercept and a factor loading we fix, without loss of generality, all the points to be on the unit interval and estimate the location and probability associated with each support point noting that the cumulative mass over all support points mass sum 1. Therefore, we estimate the parameters of the model by the non-parametric maximum likelihood estimator[10] of Heckman and Singer (1984c) from the marginal likelihood function in (9) with a nonparametric distribution for the unobserved heterogeneity component and a quadratic form for the baseline exit. To estimate the parameters of the model we use the CTM (Continuous Time Model) program developed by Yi, Honoré and Walker (1987). The estimation procedure involves jointly determining the values of the parameter vector φ and the support points that characterize the underlying distribution of the unobserved heterogeneity component θ. Conditional on the number of support points, the maximum likelihood estimates of φ asymptotically have all the desirable properties of an extremun estimator, consistency and asymptotic normality, Amemiya (1985). We achieve the empirical investigation in the next section.

5. An empirical investigation.

Before going further into the empirical results, we consider convenient a simple analysis in order to obtain information on the influence of our variables on the individual probability of leaving the unemployment state under benefits. Specifically, we are interested in trying to assess if the individuals face different probabilities and if there are factors which can explain it. According to this we will use the hazard model methodology. In the context of multiple unemployment spells the exit probability of finding a job depends not only of the probability of receiving job offer and the probability than such offer will be accepted by an unemployed but also of the possible state dependence between past and current unemployment spells duration.

[10] This maximum likelihood estimator based on (9) is consistent in the presence of θ with lagged unemployment duration.

The probability of receiving job offers will depend on personal characteristics as gender, age and educational level or qualification. Specifically, we can expect that age is related to the probability of finding a job with an inverted U form if the youngest and the oldest group have lower productivity with respect to the wages paid. We also include in our model a quadratic term to capture an inverted U form on the probability of finding a job. The job category is a variable of the National Insurance contribution group, which combines occupation and education. We expect that workers who present better qualifications have higher probability of finding a job because can receive more labour offers. With respect to the effect of the gender over the exit probability of finding a job, we think that is ambiguous.

The probability of receiving job offers will also depend on variables that indicate the local labour market conditions to the individual. We can try to measure the labour market conditions with two variables. The regional unemployment rate (quarterly) and the cause of unemployed whether end of contract or other (layoffs, etc) let give us an idea about the state of the labour demand. The regional unemployment rate indicates the local labour market conditions to the workers. We expect that workers who live in regions with lower regional unemployment rate have higher probability of finding a job because there are more vacancies.

To have registered in the Unemployment Compensation System by the end of the contract have two different effects on the probability of finding a job: First, the unemployed who entered by this cause start to search a new job before the end of the contract because know the date of the extinction of his job. Second, he could probably access to benefits at the future, and this helps him to search with intensity.

In addition, the intensity of job search is an important variable to explain the probability of receiving job offers. In this respect, the income that an individual can earn in unemployment and the entitlement duration (in days) are element that may influence the search effort and therefore, the probability of finding a job and the duration of unemployment spells. In our data the entitlement period goes from three months until twenty-four months for the unemployment insurance spells and may extend until forty eight months when the workers access to unemployment assistance (after they exhaustion of the unemployment insurance). As we can expect, the probability of finding a job will be higher among workers who have longer entitlement period because have more time to search, to assess and to accept job offers. However, some empirical studies, among them Meyer (1990), consider than the probability is constant or

decreasing in the earlier unemployment months and rises dramatically just prior to benefits lapse because the value of being unemployed and the reservation wage decrease. The disincentive effect is produced at the beginning of the unemployment spells and will be dominated by the incentive effect. To know the temporal exit to job, we have included in the model a variable to capture the effect of the days before the entitlement period expires. This variable is the duration until the exhaustion of the entitlement duration (subtraction between entitlement and current unemployment duration under benefits). Furthermore, we have included a quadratic form to get unlineal effect on the exit rate.

In relation to the income of the unemployed, we can obtain the replacement rate dividing the benefit during the unemployment episode by the income they received as a wage during their last employment spell. However, due to short variability of the replacement rate, we analyze separately the effect of the time varying unemployment benefits[11] and the wage of the last job. This type of specification has previously utilized by Meyer (1990), and Katz and Meyer (1990). The level of benefits predicts a double effect on intensity of search and on the probability of leaving unemployment. First, incentive effect occurs when the amount of benefits increases the intensity of search and the reemployment hazards, see Tannery (1983). Second, a disincentive effect occurs when high benefits causing the unemployed to be less willing to accept jobs.

Moreover, the probability that a worker may accept job offer will depend on the factors that affect his reservation wage. Concerning to the variables that affect the reservation wages we have information of the last wage and family burdens. The income of the employed reflects the incentive or disincentive effect on search and acceptance of job offer when they are unemployed, see Lancaster (1979). So, workers with higher (lower) wages in their last job have a negative effect (positive) on the reemployment hazard because have a higher reservation wage. With regard to the family burdens (which is defined in terms of the number of dependent people- spouse or other relation- if the total income of household divided by the number of members is below the minimum wage), this variable is very important because one situation in which recipients can get assistance benefits is when they exhaust insurance benefits and have family burdens. Then, we can expect that having family burdens reduce the probability

[11] We have include the level of benefits as time varying covariate because decrease with the unemployment duration spell: 80 per cent during the first six months of benefits, 70 per cent from the seventh to the twelfth month and 60 per cent from the thirteenth month onward.

of finding a job because workers know that may obtain a new benefit and no accept uninteresting jobs. In the opposite sense to have family burdens increase search effort and the acceptability of a given offer.

We also have included four dummies variables according to the quarter of exit from unemployment under benefits and the quarter of entry to the unemployment compensation system to analyze the possible seasonal effect in the Spanish economy and the calendar time effect, respectively.

To know the possible true unemployment state dependence between past and future unemployment spells we have considered in the model that explain the second unemployment spell the lagged unemployment duration under benefits to capture the effects of human capital decay. Workers suffer a loss of human capital decay when they experience an unemployment spell or because their past unemployment spell is used as a signal by employers about their low productivity. We expect that out models predict that lagged unemployment duration has a negative effect on the exit rate.

Finally, we have included in our models the GDP growth rate (quarterly) to control for business cycle influence and the factor loading that captures the sign of the effect of the unmeasured variables. We expect that the GDP will have a positive effect on the exit rate from unemployment. Concerning the factor loading as an omitted person specific effect that arises from pure heterogeneity, allowing the factor loadings to differ across consecutive spells of an event (unemployment spell) builds in the possibility of state dependence in the distribution of unobservables.

With the variables described above we have estimated two models based on the likelihood function (8) and (9) by the non-parametric maximum likelihood estimator of Heckman and Singer (1984c). Table 6 presents the results. The first and second columns show the joint estimations results of workers with one or two unemployment spell under benefits. The third and fourth columns present the joint estimation results of workers with one or two unemployment spells and had a completed past unemployment spell under benefits. Our objective is to assess the importance of the unobserved heterogeneity and the human capital decay hypothesis in explaining the state dependence between unemployment states under benefits. The age (and quadratic form), quarterly regional unemployment rate, quarterly GDP rate, level of benefits and duration until the exhaustion of the benefits (and quadratic form) are included as time varying covariates. The variable unemployment duration and duration until the exhaustion of the benefits (and cuadratic form) are measured in days, and the lagged unemployment in

months. The reference individual is a male, skilled clerical workers without family burdens who enters unemployment for other reasons (not end of contract), and enter and exit from the system in the third quarter of the year.

We will first present our results concerning lagged term and unobserved heterogeneity components, later we report the rest of the results. We appreciate in the estimations of the entire sample a negative and significant coefficient on the lagged dependent variable that suggest the evidence of true state dependence between unemployment states for young workers under benefits. This result is consistent with the human capital decay theory. The past unemployment experience has a significant effect in the future unemployment behaviour of the workers. Workers with higher experiences in past unemployment spells whatever the circumstances lose work experience, are less attractive for the employers and has less probability of finding a job, see Vishwanath (1989). Furthermore, employers may use the past unemployment experience as a signal of productivity and those with longer unemployment periods are stigmatized, see Lockwood (1991) and Omori (1997). However, we do not observe in the estimations of workers with a completed past unemployment spell that past unemployment duration causes future unemployment durations. Thus, for these workers the human capital decay theory does not exist. The explanation could be found in the composition of the sample. While the entire sample contains durations of workers with incomplete an complete past unemployment spells, the completed past unemployment sample only contains information of workers who quit the unemployment compensation system to work during their first unemployment spell. These workers present less loss work experience, are not stigmatized by employers and therefore their past unemployment experience does not influence in their future probability of finding a job.

We see from table 6 that the coefficient of the unobserved heterogeneity is positive and significant from "0" at the 5% level in all the estimations. Further, three support points are sufficient to approximate the probability distribution of the unobserved heterogeneity component. The estimated support points are 0, 0.8 and 1 with cumulative probability masses 0.47, 0.8 and 1, respectively for the entire sample and 0.7, 0.8 and 1, respectively for the sample of workers who contain a completed past unemployment spell. Therefore, the unmeasured individual characteristics influence the probability of experiencing future unemployment spells under benefits. Thus, we can affirm that both explanations, the true state and spurious state dependence are among the causes that influence the relationship between future and past unemployment spells in the entire

sample but when we consider workers with completed past unemployment spells, only the omitted person specific component affect the correlation between past and future unemployment spells under benefits.

We present now the main results on the effect of variables of current unemployment spells on the exit rate. Concerning the effect of business cycle on unemployment spell duration, the coefficient of GDP rate (quarterly) shows a positive effect on the probability of exiting from paid unemployment to employment as we expected. In seasons with high quarterly GDP rate the exit from unemployment increase because the firms create new vacants and offer better wages. Otherwise, the lower the quarterly GDP rate the higher the probability of exiting from unemployment under benefits. In relation with the coefficient of the quarterly regional unemployment rate presents a positive effect on the probability of finding a job in both samples. In regions with higher unemployment rate the workers present higher turnover with short employment spells that allows only for a relatively short entitlement periods. In these regions dominate agriculture and services structure.

The level of benefits present a positive effect on the probability of exiting from unemployed under benefits in all the estimations. Althought the standard results is that high benefits causing the unemployed to be less willing to accept jobs and continue longer periods unemployed. The incentive effect of the insurance benefit could be justified by the two following arguments: First, the benefits increase the resources devoted to search and hence increase the probability of return to work, see Tannery (1983), Ben Horim and Zuckerman (1987). Second, given the characteristics of the Spanish unemployment compensation system, as the amount of benefits decrease with the unemployment duration, the recipients who search with more intensity and get a job sooner, receive higher benefits than the others because they are less penalized due to the shorter unemployment durations.

Concerning to the influence of the last wage on the probability of finding a job, we see that in all the estimations, the recipients who received higher wages in their last job has less probabity of exiting from unemployment. This coefficient confirm that worker with higher reservation wages demanding better labour offers and are less likely to exit from the system.

Regards to the variable days until the exhaustion of the benefits and the quadratic form, we observe that the variable days until the exhaustion of the benefits and the quadratic form keep a relation in $\cap$ form. This means that the recipients leave the

Unemployment Compensation System during the intermediate months of the benefits and not rises their probability of finding a job just prior to benefits lapse as Meyer (1990) mentioned.

In relation to the baseline exit we appreciate that the unemployment duration and its quadratic form has a positive and negative influence on the logarithm of the rate of transition to a job, respectively. At the beginning there is a positive duration dependence, the exit grows with the unemployment duration because unemployed increase their intensity of search or decrease their reservation wage, but after a maximum decrease the probability of exiting to a job and hereafter there is a negative dependence duration, because employers use employment histories as a sorting device or because those youths with longer spells become more discouraged.

Concerning to the job category parameters, we observe that the highly educated worker - high level and associate professional technicians, foremen and supervisors- present more probability of finding a job that the less educated worker in all the estimations.

Regards to the cause of unemployment, workers who have entered unemployed by ending the contract in the last job have a positive and significant effect on the probability of finding a job. The unemployed who entered by this cause start to search a new job before the end of the contract because know the date of the extinction of his job or because they could probably access to benefits an future, and this helps him to search with more intensity.

In relation with the dummies that control the seasonal effect of the Spanish economy, we appreciate that during the third quarter of every year workers present lower probability of finding a job. Given the conditions of an economy like Spanish economy where agriculture and services dominate the economic structure and present higher turnover with short employment spells, workers have relatively higher probability of getting a contract just before summer and Christmas but not during the months of summer (July, August and September). In different way, workers who enter to the unemployment compensation system present in this quarter shorter duration in unemployment under benefits.

Finally, we observe that the women and the youngest and oldest people present less probability in the future to secure employment. Young and old workers present less productivity regard to the wage paid and has less probability of exiting from the system.

6. Conclusions.

In this paper we provide answers to the question if past unemployment cause future unemployment. In particular we investigate whether or not there is evidence of state dependence for the Spanish young workers. To analize this fact we use a mixed proportional hazard that allows for state dependence through lagged duration dependence in order to disentangle the effects of the unobserved individual heterogeneity and the true unemployment state dependence. We estimate the model by the non parametric maximum likelihood estimator proposed by Heckman and Singer (1984) with a flexible especification for the baseline exit and unobserved heterogeneity components. Using a sample of young workers that comes from administrative data records collected by the Spanish Employment Agency (INEM), we have found evidence that the experience of past unemployment (true state dependence) and the unobserved individual components (spurious state dependence) affect the experience of longer future unemployment spells. However, if we consider workers with completed past unemployment spells (less loss of human capital decay), we appreciate that have the same chance of reemployment no matter how long or short these periods of past unemployment have been and only the correlation between the duration of succesive unemployment spells is due to the unobserved heterogeneity across individuals.

Second, we observe evidence that workers who experience a second unemployment spell under benefits remain shorter durations in unemployment than workers who experience a first unemployment spell. This effect can be explained because workers, between their first and second unemployment spell experience under benefits, should have worked more than six months and it is like a paid training program that increase their skills habilities and their probability of finding a job

Third, workers in the entire sample present lower empirical hazard rates than workers in the completed past unemployment sample because the entire sample contains higher proportion of workers than exhausted the benefits and remained longer duration in unemployment under benefits.

Fourth, we also find evidence that the business cycle and local labour conditions have influence on the reemployment probability of exiting out of unemployment under benefits.

Finally, we appreciate that there is a seasonal effect in the Spanish economy during the third quarter of every year because workers present lower probability of finding a job in relation with the rest of the quarters. Given the conditions of an economy like Spanish economy where agriculture and services dominate the economic structure, workers have relatively higher probability of getting a contract in all the months just before the summer and Christmas but not in the months of July, August and September (the summer months).

Our finding that past unemployment cause future unemployment has an important implications for policy, thus it seems that, at least in the conditions of an economy like the Spanish economy, with high overall rates of unemployment and persistent differences in regional unemployment rates, a combination of short-term macroeconomic policies to alter the equilibrium, or natural rate, of unemployment and microeconomic policies targeted towards specific collectives, e.g. young people, females, unskilled workers, workers with longer past unemployment spells may be an effective cocktail of unemployment measures that could contribute to reduce recurrent unemployment and his effect over the possible crisis of welfare System.

Appendix.

A.1 Likelihood function for the entire sample.

The likelihood functions of the sample that contain information of workers who experience one or two unemployment spells under benefits contain six components. There are workers who has only one unemployment spell and quit the system to work (1) or exhaust their benefits (2), workers with two unemployment spells that: may find a job in their first and second unemployment spell under benefits (3) or find a job in the first unemployment spell and exhaust their benefits in the second unemployment spell (4), exhaust their benefits in the first spell and quit the system to work during the second unemployment spell (5), or exhaust their first and second unemployment spell under benefits (6). Thus, the likelihood function for this type of data would be

$$\Pr(t_1, C_{t1}; t_2, C_{t2}) = P_1(t_1, C_{t1}) \times P_2(t_2, C_{t2} | t_1) \times P_2(t_2, C_{t2} | C_{t1})$$
$$= \Pr(T=t_1, d_1=1) \times \Pr(T=C_{t1}, d_1=0, d_2=1) \times \Pr(T=t_2, d_1=d_2=0, d_3=1) \times$$
$$\times \Pr(T=C_{t2}, d_1=d_2=d_3=0) \times \Pr(T=t_2, d_1=d_2=d_3=0, d_4=1) \times$$
$$\times \Pr(T=Ct_2, d_1=d_2=d_3=d_4=0).$$

where the first term is

$$\Pr(T=t_1|d_1=1) \times \Pr(d_1=1) = \Pr(t_1=T|t_1 \leq C_{t1}) \times \Pr(t_1 \leq C_{t1}) =$$
$$= \left[\frac{f(t)}{1 - S(C_{t1})} \right] (1-S(C_{t1})) = f(t_1).$$

The second term

$$\Pr(T=C_{t1}, d_1=0, d_2=1) = \Pr(T=C_{t1} | d_1=0, d_2=1,) \times \Pr(d_1=0, d_2=1) =$$
$$= \Pr(t_1 > C_{t1}) = S(C_{t1}).$$

The third term

$$\Pr(T=t_2, d_1=0, d_2=0, d_3=1) = \Pr(T=t_2 | d_1=0, d_2=0, d_3=1) \times \Pr(d_1=0, d_2=0, d_3=1) =$$
$$= \Pr(t_2 < C_{t2}) \times \Pr(t_1 < C_{t1}) = f(t_2) \times f(t_1).$$

The fourth term

$\Pr(T=C_{t2}, d_1=0, d_2=0, d_3=0) = \Pr(T=C_{t2} | d_1=0, d_2=0, d_3=0) \times \Pr(d_1=0, d_2=0, d_3=0) =$

$= \Pr(t_2 > C_{t2}) \times \Pr(t_1 < C_{t1}) = S(C_{t2}) \times f(t_1).$

The fifth term is

$\Pr(T=t_2, d_1=d_2=d_3=0, d_4=1) = \Pr(T=t_2 | d_1=d_2=d_3=0, d_4=1) \times \Pr(d_1=d_2=d_3=0, d_4=1) =$

$= \Pr(t_2 < C_{t2}) \times \Pr(t_1 > C_{t1}) = f(t_2) \times S(C_{t1}).$

Finally the last component is

$\Pr(T=Ct_2, d_1=d_2=d_3=d_4=0) = \Pr(T=C_{t2} | d_1=d_2=d_3=d_4=0) \times \Pr(d_1=d_2=d_3=d_4=0) =$

$= \Pr(t_2 > C_{t2}) \times \Pr(t_1 > C_{t1}) = S(t_2) \times S(C_{t1}).$

Regrouping the terms, the likelihood function for "n" individual would be

$$L(t_1, t_2, X(t_{ij}), \theta) = \prod_{i=1}^{n} \left[f(t_{i1}, X(t_{i1}), q) \right]^{d_{i1}} \times \left[S(C_{ti1}, X(t_{i1}), q) \right]^{d_{i2}(1-d_{i1})} \times$$

$$\times \left[\{ f(t_{i2}, X(t_{i2}), q) \} \times \{ f(t_{i1}, X(t_{i2}), q) \} \right]^{d_{i3}(1-d_{i1})(1-d_{i2})} \times$$

$$\times \left[\{ S(C_{ti2}, X(t_{i2}), q) \} \times \{ f(t_{i1}, X(t_{i2}), q) \} \right]^{(1-d_{i1})(1-d_{i2})(1-d_{i3})} \times$$

$$\times \left[\{ f(t_{i2}, X(t_{i2}), q) \} \times \{ S(C_{ti1}, X(t_{i2}), q) \} \right]^{d_{i4}(1-d_{i1})(1-d_{i2})(1-d_{i3})} \times$$

$$\times \left[\{ S(t_{i2}, X(t_{i2}), q) \} \times \{ S(C_{ti1}, X(t_{i2}), q) \} \right]^{(1-d_{i1})(1-d_{i2})(1-d_{i3})(1-d_{i4})} \qquad (8)$$

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Table 1. Pre - 1992 period.

Contribution period (C). (Over the last 4 years)	**Entitlement U. I. (2 × integer (C/3))**	**Unemployment assistance after exhausted U.I.**			
		With family burdens		**Without family burdens**	
		< 45 years	**≥ 45 years**	**<45 years**	**≥45 years**
3 months	-	3 months	3 months		
4 months	-	4 months	4 months		
5 months	-	5 months	5 months		
From 6 to 12months	3 months	18 months	24 months	-	-
From 12 to 18 months	6 months	24 months	30 months	-	-
From 18 to 24 months	9 months	24 months	30 months	-	-
From 24 to 30 months	12 months	24 months	30 months	-	6 months
From 30 to 36 months	15 months	24 months	30 months	-	6 months
From 36 to 42 months	18 months	24 months	30 months	-	6 months
From 42 to 48 months	21 months	24 months	30 months	-	6 months
48 months	24 months	24 months	6+30 months	-	6+6 months
> 52 years	-	Up to retirement			

Table 2. Descriptive statistics variables of unemployed who has one or two unemployment spells under benefits. The entire sample.

		First spell.			Second spell.		
Covariates.	**Dummy.**	**Mean.**	**Std.**	**%.**	**Mean.**	**Std.**	**%.**
Gender.							
Male.				55.7			58.7
Female.				44.3			41.3
Age (years).							
Entry age.		24.93	4.15	100	26.72	4.34	100
Exit age.		25.68	4.41	100	27.25	4.43	100
Exit age square.		678.92	235.60	100	762.46	251.71	100
Family Burdens.							
With.	*			13			21.7
Without.	*			87			78.3
Type of Observation.							
Uncompleted Duration.	*			64.5			58.6
Completed duration.	*			35.5			41.4
Duration. (Days).							
Current True Duration		270.74	316.27	100	192.19	196.85	100
Entitlement Duration		354.84	339.36	100	285.77	248.40	100
Lagged duration (days).		-	-	-	173.7	198.9	100
Durat. until the exhaust.		84.11	164.35	100	93.57	164.95	100
(Dur. until exhaust. /10)^2		340.85	879.83	100	359.64	841.87	100
Entitlement Period.							
From 0 to 6 months.		3.76	1.31	55.2	3.73	1.28	59.1
From 6 to 15 months.		11.22	2.33	14	10.96	2.29	14.9
From 15 to 24 months.		21.56	2.16	21.8	20.15	2.19	22.4
More than 24 months.		38.47	6.91	9.1	32.98	4.22	3.6
Benefits (thous./month).		61.00	15.04	100	67.47	15.93	100
Wage (thousand/month).		67.79	22.63	100	74.69	25.26	100
Cause of Unemployment.							
End of Contract.	*			97			98.8
Other.	*			3			1.2
Exit of the SIPRE.							
Job.	*			35.5			41.4
Benefits Exhausted.	*			64.5			58.6
Job Category.							
1	*			7			7
2	*			8.6			8.6
3	*			4.2			4.1
4	*			16.4			13.1
5	*			15.2			20.9
6	*			20.7			21.3
7	*			27.9			25
Economic Variables.							
Quarterly GDP rate.		3.98	1.23	100	4.11	1.29	100
Quart. reg. Unempl. Rate.							
Low		12.73	1.14	37.5	12.57	1.17	46.1
Intermediate.		16.45	0.91	20.2	16.42	0.90	20.7
High.		19.23	0.82	14.7	19.25	0.83	7.4
Very high.		26.71	3.31	27.6	26.49	2.50	25.8
Dummy of entry.							
1st quarter.				25.1			22.9
2nd quarter.				24.7			23.2
3rd quarter.				11.2			17.1
4th quarter.				39			36.9
Dummy of exit.							
1st quarter.				29.5			30.9
2nd quarter.				24.9			24.7
3rd quarter.				24.3			23.1
4th quarter.				21.3			21.3
Sample size.			175,103			69,782	

Legend for category. 1.High levels and associate professional technicians, foremen and supervisors; 2.Technical assistants and skilled clerical workers; 3. Semi skilled clerical workers;4. Unskilled clerical workers ; 5. Skilled production workers; 6. Semi skilled production workers ; 7. Unskilled production workers.

Table 3. Descriptive statistics variables of unemployed with one or two unemployment spells under benefits and a completed past unemployment spell. The completed past unemployment sample.

		First spell.			Second spell.		
Covariates.	**Dummy.**	**Mean.**	**Std.**	**%.**	**Mean.**	**Std.**	**%.**
Gender.							
Male.				56			65.5
Female.				44			34.5
Age (years).							
Entry age.		25.13	4.14	100	27.07	4.39	100
Exit age.		25.97	4.43	100	27.59	4.46	100
Exit age square.		694.13	238.32	100	781.49	255.21	100
Family Burdens.							
With.	*			14.4			24.8
Without.	*			85.6			75.2
Type of Observation.							
Uncompleted Duration.	*			52.6			44.1
Completed duration.	*			47.4			55.9
Duration. (Days).							
Current True Duration		302.98	340.24	100	189.25	196.76	100
Entitlement Duration		415.40	354.35	100	321.56	256.74	100
Lagged duration (days).					171.9	192.9	100
Durat. until exhaust.		112.42	181.44	100	132.31	185.03	100
(Dur. until exhaus./10)^2		455.59	991.18	100	517.36	982.52	100
Entitlement Period.							
From 0 to 6 months.		3.96	1.39	45.3	3.97	1.40	50.6
From 6 to 15 months.		11.27	2.34	16.3	11.12	2.34	20.9
From 15 to 24 months.		21.54	2.15	27	20.07	2.11	23.5
More than 24 months.		38.51	6.96	11.4	33.26	4.48	5
Benefits (thous./month).		62.53	15.57	100	69.97	17.04	100
Wage (thousand/month).		69.62	23.87	100	78.79	26.68	100
Cause of Unemployment.							
End of Contract.	*			96.4			98.7
Other.	*			3.6			1.3
Exit of the SIPRE.							
Job.	*			47.4			55.9
Benefits Exhausted.	*			52.6			44.1
Job Category.							
1	*			7.4			7.3
2	*			9.2			8.6
3	*			4.2			4
4	*			17.1			12.1
5	*			14.6			22.4
6	*			20.1			21.3
7	*			27.4			24.4
Economic Variables.							
Quarterly GDP rate.		3.89	1.25	100	4.03	1.28	100
Quart. reg. Unempl. Rate.							
Low		12.65	1.15	41.3	12.52	1.17	46.2
Intermediate.		16.40	0.90	20.2	16.36	0.89	20.7
High.		19.23	0.83	12.6	19.26	0.83	7.7
Very high.		26.38	3.15	25.9	26.38	2.51	25.4
Dummy of entry.							
1st quarter.	*			26.8			25
2nd quarter.	*			26.5			23.8
3rd quarter.	*			9.0			18.3
4th quarter.	*			37.7			32.8
Dummy of exit.							
1st quarter.	*			26.6			27.2
2nd quarter.	*			26			25.2
3rd quarter.	*			25.4			24.1
4th quarter.	*			22			23.4
Sample size.			131,002			25,681	

Legend for category see table 2.

Table 4. Gross hazard rates by variables. The entire sample.

	1st Spell.			2nd Spell.		
	Gross hazard.	**E.S.**	**%**	**Gross hazard**	**E.S.**	**%**
Covariates						
Whatever individual.	3.93	0.015	100	6.46	0.037	100.00
Sex.						
Male.	4.62	0.022	117.66	8.34	0.057	129.21
Female.	3.02	0.021	76.85	4.41	0.044	68.32
Age.						
18-22 years.	5.54	0.005	141.26	7.54	0.159	116.74
22-26 years.	5.24	0.002	133.52	7.09	0.071	109.89
26-30 years.	3.60	0.002	91.66	6.39	0.066	99.06
30-35 years.	2.84	0.002	72.46	5.97	0.073	92.54
>35 years.	0.70	0.004	17.80	5.15	0.108	79.80
Family burdens						
With.	3.33	0.031	84.89	5.48	0.060	84.86
Without	4.08	0.018	103.96	6.93	0.046	107.29
Job category.						
1	7.31	0.097	186.13	9.45	0.191	146.37
2	3.19	0.042	81.11	5.99	0.121	92.92
3	5.41	0.099	137.84	7.78	0.209	120.60
4	3.57	0.036	90.88	5.66	0.092	87.77
5	4.38	0.042	111.62	6.99	0.085	108.32
6	3.49	0.031	88.92	6.18	0.077	95.78
7	3.81	0.029	96.95	6.06	0.069	93.87
Quarterly Unemp. Reg. Rate.						
Low.	3.32	0.021	84.51	6.20	0.052	96.05
Intermediate.	4.03	0.034	102.63	6.64	0.084	102.99
High	5.53	0.056	140.76	9.61	0.186	148.97
Very high.	4.25	0.033	108.26	6.11	0.069	94.59
Quarterly GDP rate.						
>1 and <3	3.69	0.027	94.14	4.42	0.051	68.44
>=3 and <5	3.70	0.020	94.21	6.82	0.053	105.69
>5	5.15	0.044	131.16	11.22	0.138	173.84
Cause of unemployment.						
End of the contract.	4.01	0.016	102.19	6.48	0.037	100.41
Others.	2.59	0.051	65.99	5.02	0.241	77.80
Level of benefits.						
<= 60 thousand ptas month.	2.98	0.015	75.81	4.75	0.037	73.59
60-80 thousand ptas. month.	8.31	0.067	211.68	9.45	0.103	146.45
80-100 thousand ptas month.	12.36	0.144	314.57	12.41	0.172	192.29
>100 thousand ptas. month.	18.71	0.482	476.16	18.88	0.474	292.48
Net Wage.						
<= 60 thousand ptas/month.	3.05	0.021	77.69	4.45	0.052	68.97
60-75 thousand ptas/ month.	3.84	0.025	97.85	6.22	0.063	96.32
75-100 thousand month.	5.27	0.045	134.07	8.21	0.086	127.19
100-125 thousand month.	6.61	0.101	168.33	10.37	0.190	160.58
125-150 thousand month.	7.97	0.194	202.93	11.04	0.328	171.01
>150 thousand month.	8.77	0.252	223.18	11.93	0.418	184.82

Continuation table 4.

	1st Spell.			2nd Spell.		
	Gross hazard	**E.S.**	**%**	**Gross hazard**	**E.S.**	**%**
Dummies of entry.						
1st quarter.	3.89	0.030	99.01	7.20	0.080	111.60
2nd quarter.	3.74	0.030	95.15	5.64	0.067	87.39
3rd quarter.	4.01	0.047	102.08	7.00	0.093	108.44
4th quarter.	4.07	0.026	103.61	6.29	0.063	97.57
Dummies of exit.						
1st quarter.	4.91	0.036	124.99	7.17	0.079	111.17
2nd quarter.	4.14	0.031	105.36	6.32	0.068	97.91
3rd quarter.	3.44	0.029	87.49	5.89	0.071	91.25
4th quarter.	3.36	0.028	85.69	6.48	0.076	100.39
Lagged unempl. Duration.						
<=3 months	-	-	-	6.70	0.049	103.86
>3 and <=6 months	-	-	-	7.30	0.095	113.08
>6 and <=12 months	-	-	-	6.92	0.117	107.24
>12 and <=18 months	-	-	-	6.11	0.161	94.69
>18 and <=24 months	-	-	-	4.26	0.117	65.95
>24 months	-	-	-	2.37	0.112	36.74

Table 5. Gross hazard rates by variables. The completed past unemployment sample.

	1st Spell.			2nd Spell.		
	Gross hazard.	**E.S.**	**%**	**Gross hazard**	**E.S.**	**%**
Covariates						
Whatever individual.	4.69	0.018	100	8.86	0.071	100
Sex.						
Male.	7.51	0.036	160.18	10.52	0.099	118.74
Female.	2.67	0.018	57.01	6.48	0.095	73.18
Age.						
18-22 years.	7.47	0.069	159.22	10.11	0.314	114.00
22-26 years.	6.53	0.042	139.10	9.73	0.140	109.79
26-30 years.	4.21	0.032	89.64	8.77	0.126	98.91
30-35 years.	3.23	0.029	68.96	8.42	0.137	94.93
>35 years.	0.76	0.031	16.29	7.24	0.201	81.69
Family burdens						
With.	3.79	0.036	80.98	8.51	0.126	96.09
Without	4.94	0.021	105.29	9.02	0.085	101.71
Job category.						
1	8.65	0.114	184.44	12.53	0.351	141.41
2	3.63	0.048	77.31	8.23	0.227	92.86
3	6.46	0.117	137.66	9.72	0.381	109.68
4	4.16	0.041	88.68	7.55	0.179	85.21
5	5.38	0.052	114.85	9.48	0.156	107.02
6	4.21	0.037	89.72	8.67	0.150	97.82
7	4.61	0.035	98.36	8.48	0.139	95.73
Quarterly Unemp. Reg. Rate.						
Low.	3.72	0.024	79.3	8.46	0.100	95.4
Intermediate.	4.91	0.042	104.5	9.01	0.160	101.7
High	7.68	0.077	163.8	12.67	0.340	142.9
Very high.	5.30	0.040	113.1	8.64	0.136	97.5
Quarterly GDP rate.						
>1 and <3	4.09	0.030	87.3	6.18	0.099	69.7
>=3 and <5	4.46	0.025	95.0	9.15	0.098	103.2
>5	7.02	0.060	149.6	16.88	0.289	190.5
Cause of unemployment.						
End of the contract.	4.81	0.019	102.51	8.87	0.071	100.06
Others.	2.95	0.058	62.98	8.52	0.547	96.09
Level of benefits.						
<= 60 thousand ptas month.	3.54	0.017	75.42	6.34	0.073	71.56
60-80 thousand ptas. month.	10.45	0.083	222.88	12.76	0.189	143.98
80-100 thousand ptas month.	14.54	0.168	309.81	15.93	0.290	179.72
>100 thousand ptas. month.	19.33	0.496	412.06	22.49	0.707	253.71
Net Wage.						
<= 60 thousand ptas/month.	3.79	0.026	80.97	6.86	0.123	77.45
60-75 thousand ptas/ month.	4.56	0.030	97.34	7.99	0.115	90.14
75-100 thousand month.	5.92	0.051	126.21	10.20	0.145	115.06
100-125 thousand month.	7.30	0.111	155.62	12.16	0.291	137.12
125-150 thousand month.	8.59	0.208	183.06	13.16	0.509	148.42
>150 thousand month.	9.34	0.268	199.02	13.55	0.600	152.82

Continuation table 5.

	1st Spell.			2nd Spell.		
	Gross hazard	**E.S.**	**%**	**Gross hazard**	**E.S.**	**%**
Dummies of entry.						
1st quarter.	4.52	0.034	96.3	8.96	0.140	101.1
2nd quarter.	4.32	0.034	92.0	8.45	0.139	95.3
3rd quarter.	5.39	0.063	115.1	9.18	0.169	103.6
4th quarter.	4.91	0.031	104.7	8.93	0.126	100.7
Dummies of exit.						
1st quarter.	6.14	0.045	130.9	10.04	0.155	113.3
2nd quarter.	4.89	0.037	104.3	9.15	0.140	103.3
3rd quarter.	4.13	0.035	88.0	8.31	0.137	93.8
4th quarter.	3.89	0.032	82.9	8.05	0.133	90.8
Lagged unempl. Duration.						
<=3 months	-	-	-	9.74	0.109	109.83
>3 and <=6 months	-	-	-	8.82	0.147	99.47
>6 and <=12 months	-	-	-	8.29	0.172	93.55
>12 and <=18 months	-	-	-	7.44	0.225	83.96
>18 and <=24 months	-	-	-	6.74	0.287	76.02
>24 months	-	-	-	6.21	0.362	70.08

Table 6. Parameters estimates and their standard errors.

	Entire sample.				Sample with completed past unempl.			
	1st spell.		2nd spell.		1st spell.		2nd Spell.	
	Param.	**S. E.**	**Param.**	**S. E.**	**Param.**	**S.E.**	**Param.**	**S. E.**
Intercept.	-137.743	5.2250	-301.61	15.3558	-161.88	5.3030	-330.361	20.9685
Duration (days).	10.0471	0.5969	36.7174	1.2589	11.4402	0.6172	31.6258	1.5881
Duration square (days).	-300.986	11.5169	-683.13	32.8902	-353.29	11.7098	-731.805	44.7410
Sex (female)	-0.6611	0.0096	-0.5714	0.0151	-0.6549	0.0102	-0.4210	0.0206
(Age time varying /10) in years.	-1.0700	0.1186	-2.1680	0.1786	-1.3022	0.1274	-2.2192	0.2560
(Age time varying /100)^2 in years.	0.1129	0.0221	0.3215	0.0311	0.1538	0.0238	0.3148	0.0443
Job category.								
1	0.3108	0.0187	0.1550	0.0308	0.3077	0.0202	0.1885	0.0405
2	-0.1841	0.0177	-0.1290	0.0282	-0.1959	0.0189	-0.1177	0.0366
3	0.0941	0.0222	0.0743	0.0355	0.0662	0.0239	-0.0138	0.0484
4	-0.0262	0.0156	-0.0453	0.0249	-0.0644	0.0167	-0.1111	0.0336
5(&)	-	-	-	-	-	-	-	-
6	-0.1164	0.0143	-0.0901	0.0208	-0.1266	0.0154	-0.1065	0.0268
7	-0.1355	0.0136	-0.0925	0.0198	-0.1756	0.0147	-0.0703	0.0261
Family burdens (with)	0.0494	0.0119	-0.2627	0.0163	0.0414	0.0128	-0.1156	0.0211
Benefits t.v. (thous. ptas. month).	0.0433	0.0004	0.0323	0.0006	0.0424	0.0004	0.0322	0.0008
Net wages(thous. ptas. month).	-0.0141	0.0003	-0.0051	0.0004	-0.0151	0.0003	-0.0090	0.0006
End of the contract.	0.1741	0.0218	0.2073	0.0581	0.1403	0.0231	0.0978	0.0763
Dur. until exhaust. t.v. (days/10)	0.0713	0.0008	0.0760	0.0013	0.0552	0.0008	0.0624	0.0018
(Dur. until exh. t.v.)^2 (days /1000)	-0.0108	0.0001	-0.0106	0.0002	-0.0092	0.0001	-0.0091	0.0003
Lagged duration (months).	-	-	-0.0171	0.0011	-	-	0.0002	0.0015
Quart. reg. unempl. rate t.v.	0.0073	0.0008	-0.0008	0.0012	0.0146	0.0008	0.0049	0.0018
Quart. GDP rate t.v.	-0.0278	0.0036	0.0950	0.0066	-0.0040	0.0038	0.1057	0.0092
Dummies exit.								
1st quarter.	0.2803	0.0125	0.1978	0.0194	0.3405	0.0132	0.1372	0.0250
2nd quarter.	0.1654	0.0125	0.1076	0.0190	0.1563	0.0133	0.0615	0.0250
3rd quarter. (&)	-	-	-	-	-	-	-	-
4th quarter.	0.0126	0.0126	0.0510	0.0194	0.0406	0.0135	-0.0508	0.0259
Dummies of entry.								
1st quarter.	-0.1217	0.0153	-0.0065	0.0201	-0.2324	0.0162	-0.0408	0.0268
2nd quarter.	-0.1357	0.0151	-0.1542	0.0205	-0.2533	0.0161	-0.0636	0.0270
3rd quarter.(&)	-	-	-	-	-	-	-	-
4th quarter.	-0.1208	0.0145	-0.1235	0.0196	-0.2232	0.0155	-0.0495	0.0261
Factor loading.	0.5212	0.0272	1.2624	0.0398	0.9785	0.0163	1.0747	0.0455
Sample (censored %).	175,103(64.5)		69,782(58.6)		131,002(52.6)		25,681(44.1)	
Log likelihood.	-192617.6998				-175439.8145			

Legend. Job category in table 2. & indicates the characterictics of the reference individual.; t.v. means time varying covariate.

Table 7. Support points that approximate the probability distribution of the unobserved heterogeneity component corresponding to estimation of table 6.

	Entire sample			**Completed past unemployment sample.**		
Support points.	**Localiz.**	**Cum. prob.**	**Sign.**	**Localiz.**	**Cum. prob.**	**Sign.**
First point.	0.00	0.54	***	0.00	0.70	***
Second point.	0.80	0.80	***	0.8	0.80	***
Third point.	1.00	1.00	***	1.00	1.00	***

Legend. *** (0,01 significant); ** (0,05 significant); * (0,1 significant).

Figure 1. Empirical hazard of workers who experience one or two unemployment spells under benefits. The entire sample.

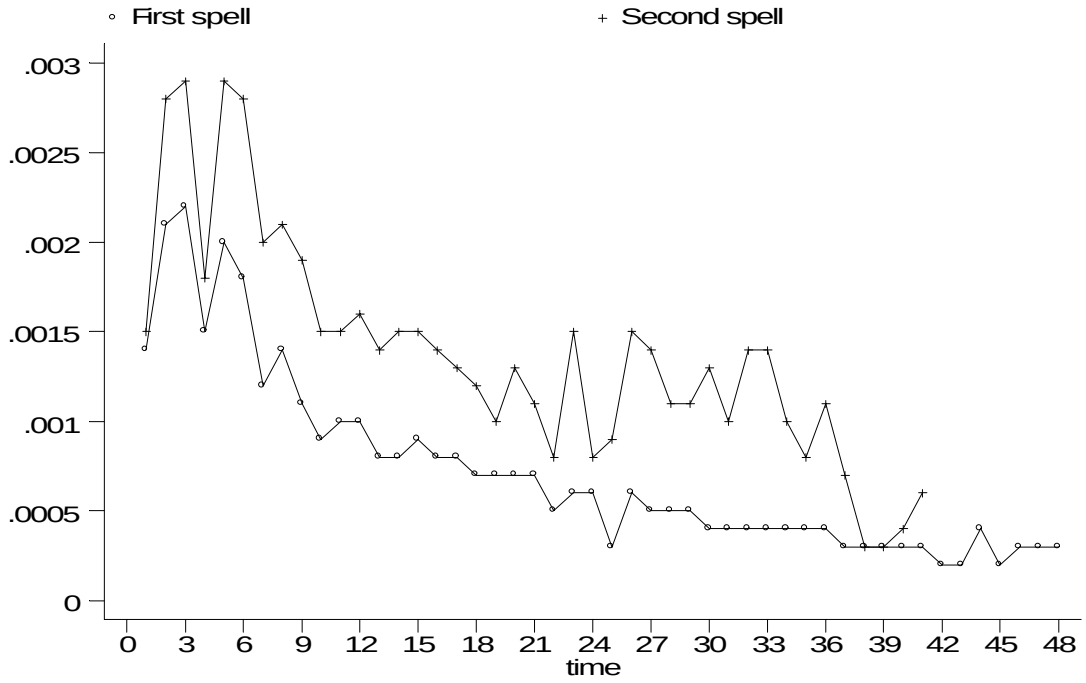

Figure 2. Empirical hazard of workers who experience one or two unemployment spell under benefits and have a completed past unemployment spell. The completed past unemployment sample.

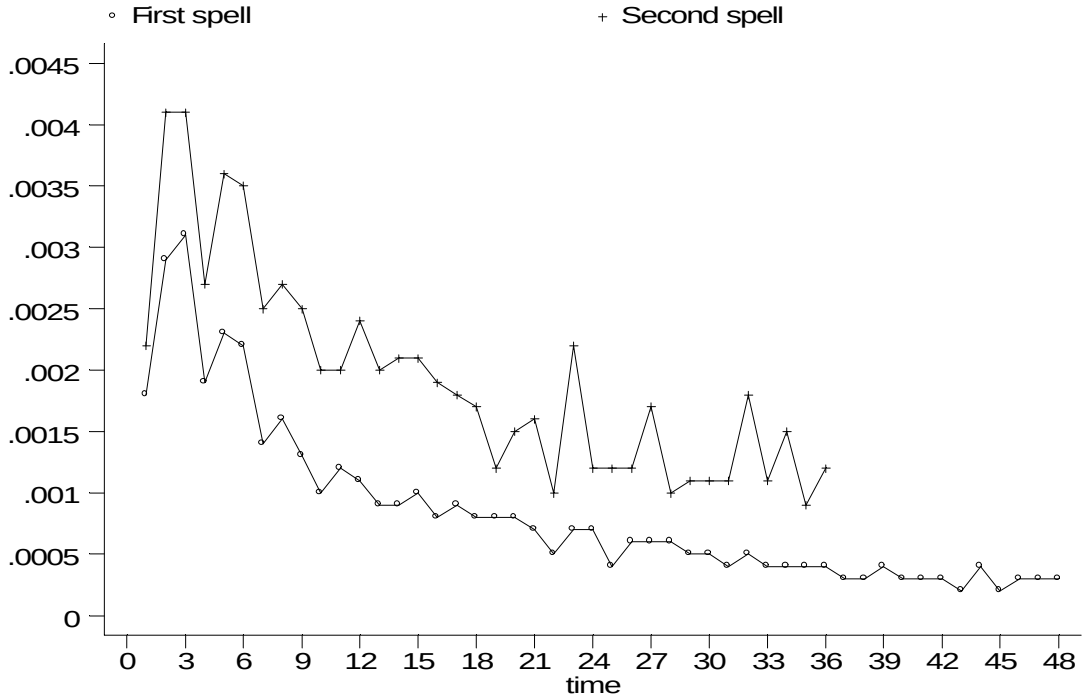

Figure 3. Empirical hazard of the entire sample and the completed past unemployment sample.