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Department of Economics

Economic Conditions and Employment Dynamics of Immigrants versus Natives: Who Pays the Costs of the "Great Recession"?*

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Abstract

This paper studies how unemployment and employment durations for immigrants and natives respond differently to changes in the economic conditions due to the 2008 crisis and to the receipt of unemployment benefits when the economy declines. Using administrative data for Spain, we estimate multi-state multi-spell duration models that disentangle unobserved heterogeneity from true duration dependence. Our findings suggest that immigrants are more sensitive to changes in economic conditions, both in terms of unemployment and employment hazards. Moreover, the effect of the business cycle is not constant but decreases with duration at a higher rate among immigrants. The results also point to a disincentive effect of unemployment benefits on unemployment duration, which is stronger for immigrants but only at the beginning of the unemployment spell and mainly during good times (before the 2008 recession). Finally, we find evidence of a positive effect of unemployment benefits on subsequent employment duration, but only for native workers with temporary contracts. Nonetheless, this effect vanishes as workers qualify again for unemployment benefits.

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Keywords: Duration models; Multiple spells; Unobserved heterogeneity; Unemployment Benefits; Economic cycle; Immigration.

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1 Introduction

The economics literature concerning immigration has shown that there are relevant differences between the labor market performance of native and foreign-born individuals. Several papers have investigated how employment and unemployment probabilities and welfare participation rates differ between natives and immigrants (see Baker et al., 1995, Chiswick et al., 1997; Uhlendorff and Zimmermann, 2006; Borjas and Hilton, 1996; Hansen and Lofstrom, 2003). Another strand of the literature has studied how immigrants respond to the economic cycle compared to natives. For instance, Barth et al. (2006) examine the relationship between local labor market conditions and the wages of immigrants and natives in the US, finding that the wages of immigrants are more sensitive to local labor market conditions than the wages of natives. Dustman et al. (2010) compute unemployment rates and mean wage differentials between natives and immigrants in Germany and the UK and find larger unemployment responses for immigrants relative to natives and little evidence that wage responses are different.

This paper contributes to the literature by focusing on unemployment and employment durations. Specifically, we investigate how immigrants and natives respond differently to changes in the economic conditions due to the 2008 "Great Recession" and to the receipt of unemployment benefits when the economy declines. The duration framework allows us to account for dynamic aspects of individuals' labor market behavior, which is important because workers' reemployment prospects tend to deteriorate the longer they are unemployed (Abbring et al., 2002) and firms' recruiting decisions also depend on candidates' unemployment duration (Viswanath, 1989).

The consequences of the severe worldwide economic downturn in the late 2000's is an issue of social and political concern. Analyzing whether the negative effects on unemployment and employment durations are more pronounced

among the immigrant relative to the native workforce might be also useful for the design of immigration and welfare policies. Moreover, accounting for differences in business cycle effects for immigrants relative to natives has important implications for the measurement of the relative economic performance of immigrants. As Barth et al. (2006) note, the assumption made in some empirical studies that period effects are equal for natives and immigrants may lead to severe bias in estimates of assimilation effects.

With the emergence of the great recession unemployment insurance design is also in the heart of the political debate. In this paper we analyze the potential disincentive effect of unemployment insurance on unemployment duration and its potential beneficial effect on subsequent employment duration. As Tatsiramos (2009) note, the latter effect could be important because the receipt of unemployment benefits may improve the matching of the unemployed to job vacancies and, therefore, may increase subsequent employment stability. Thus, from a policy point of view it seems that the analysis of unemployment insurance systems should account for the net effect of unemployment benefits on the labor market behavior of different groups of workers.

Spain is an interesting case for investigating these issues because it is one of the European countries where immigration flows have increased the most noticeably during the last decade. The foreign-born population living in Spain surged from approximately 600 thousand (1.5% of the total population) in 1998 to more than 5.7 million (12.2% of the total population) in 2011. These figures are among the largest in Europe.[1] Moreover, Spain faces one of the highest unemployment rates in the E.U: In 1996, the male unemployment rate stood at almost 18%, which then decreased for ten years, falling to 6% in 2006, and then shot up again to 20% in 2011.

Our empirical analysis is performed using administrative data, the *Contin-*

[1] Smaller countries such as Luxembourg and Cyprus experienced similar rates in certain periods.

uous Sample of Working Histories, which contains information on the complete employment history of a sample of approximately 1,2 million workers registered with the Social Security Administration during the period 2000-2011. This data set has two features that are crucial for our purposes. First, the sample period covers the pre-recession (up to 2008) and the recession years, which allows us to assess the effect of changes in the economic conditions. Second, this data-set offers information on multiple spells of unemployment and employment for the same individuals.[2] This information is crucial for disentangling unobserved heterogeneity, which could give rise to spurious negative duration dependence, from genuine duration dependence (see Heckman, 1991).

Concerning econometric methods, we estimate multi-state multi-spell discrete time duration models for male immigrants and natives separately. Specifically, we estimate unemployment and employment hazards by maximum likelihood, assuming that the distribution of the unobserved heterogeneity is discrete with finite support (see Heckman and Singer, 1984). As with panel data models, the support-point approach with multiple spells improves the identification of the parameters of interest with respect to the single-spell case.[3] Moreover, it allows for a flexible specification of the unobserved heterogeneity, because it is possible to allow for dependence between the unobservable variables that influence both unemployment and employment durations.

Our results indicate that immigrants are more sensitive to changes in economic conditions, both in terms of unemployment and employment hazards. Moreover, the effect of the economic cycle is not constant but decreases with duration at a higher rate among immigrants. The results also point to a disincentive effect of unemployment benefits on unemployment duration, which is stronger for immigrants but only at the beginning of the unemployment spell.

[2] Hansen (2000) and Kalwij (2010) also use multiple spell data to study individuals' unemployment experiences.

[3] See Abbring and van den Berg (2003).

For immigrants the disincentive effect of benefits is more important during the expansionary period, that is, before 2008. Finally, we find evidence of a positive effect of unemployment benefits on subsequent employment duration, but only for native workers with temporary contracts. Nonetheless, this effect vanishes as workers qualify again for unemployment benefits.

The rest of the paper is organized as follows. Section 2 describes some relevant features of the Spanish labor market and the data. Section 3 formulates the econometric model and discusses the estimation procedure. Section 4 reports and discusses the estimation results. Section 5 concludes.

2 Some Stylized Facts and Data Description

The evolution of unemployment and employment rates for immigrants and natives in Spain is shown in Table 1. The evidence from the Labor Force Survey (LFS) shows that throughout the period 2000-2007 the unemployment rates among male immigrants were on average approximately 4 percentage points (p.p.) higher than for natives. However, the difference increases to 15 p.p. on average during the period 2008-2011. Table 1 also indicates that unemployment tends to be longer for natives than for immigrants, although the differences between the groups decrease during the recession (2008-2011).

As for the employment rates, it is well known that Spain's government has strongly promoted temporary contracts with the purpose of increasing labor market flexibility and reducing unemployment (See Dolado et al, 2002, for example). Several labor market reforms have been aimed at fighting the prevalence of temporary employment, but they have not been very successful. Table 2 shows that the share of temporary workers among natives is on average approximately 33% of employees, while among immigrants, this proportion increases to 55%. Regarding the duration of employment spells, immigrants have shorter durations than native workers, both in temporary and permanent employment.

The impact of immigration on the cost of welfare has also been extensively studied in the literature.[4] This paper focuses on the receipt of unemployment benefits. Unemployed workers in Spain are covered by two successive benefits:[5] a contributory unemployment insurance benefit and then an assistance benefit. Unemployment Insurance can be paid to a registered unemployed person aged 16-64, who is actively seeking work, and who did not leave her previous job voluntarily. Unemployment Assistance grants income to those 16 to 64 year-old workers with dependents and income below a certain threshold, who have exhausted their entitlement to contributory benefits and to those with no entitlement to contributory benefits, but who paid contributions for at least 3 months. Data from the LFS indicate that the use of unemployment benefits among immigrants has increased considerably since 2006, reaching amounts similar to those for natives, especially in 2010 (45.6% for both groups). Between 2006 and 2011, the increase for natives has been 12 p.p., while for immigrants the increase has been approximately 26 p.p.

2.1 The Data

We use Spanish administrative data from the *Continuous Sample of Working Histories* (*Muestra Continua de Vidas Laborales,* MCVL, in Spanish). It is a representative sample of the population registered with the Social Security Administration in the reference year (so far, from 2004 to 2011). The raw data represent a 4% random sample of the reference population (pension earners, unemployment benefit recipients, employees, and self-employed workers) that amounts to approximately 1,2 million individuals each year.

The main characteristic of the MCVL is that it offers retrospective information. Therefore, we have information on the entire labor history of the workers registered with the Social Security Administration during the year the sample

[4] For Spain, Rodriguez-Planas (2011) finds that immigrants are less likely to participate in social assistance programs, and are more likely to receive unemployment insurance when the crisis hits.

[5] For a detailed description see Bentolila and Jimeno (2006).

is extracted. Moreover, this data-set has a longitudinal structure from 2005 to 2011, meaning that an individual who is present in a wave and remains registered with Social Security stays as a sample member. In addition, the sample is refreshed with new entrants, which guarantees the representativeness of the population in each wave. In our estimates, we use the last six waves (2006-2011),[6] so that only those workers without a connection to the Social Security Administration during at least one day in the last six years are excluded from our sample.

Although we can reconstruct the labor market histories of the individuals in the sample back to 1980, some relevant characteristics, such as the type of contract, are missing for pre-2000 spells. Moreover, sample representativeness tends to be less accurate as one goes back in time (see Bonhomme and Hospido, 2012, for details). Therefore, we only use observations for the period 2000-2011. This means that the spells that end before 2000 are dropped from our sample, and we use only the 2000-2011 monthly observations for spells that started before 2000 and are ongoing after 2000.

We exclude from our sample workers who are not enrolled in the general regime of the Social Security Administration.[7] We keep male workers for whom the first observation (first spell of employment) is before the age of 30 (35 in the case of immigrants). This age selection maximizes the probability of not having missing employment spells in the sample, and, hence, allows us to compute the exact entitlement to unemployment benefits for each of the observed unemployment spells.[8] For these individuals, we observe their labor market history up to age 49. Finally, we select male workers to avoid the problem

[6] The first wave is not fully comparable to the others and the 2005 wave is not used in order to reduce the size of the data set.

[7] In Spain, less than 20% of workers are enrolled in other regimes, including some civil servants, workers in the agricultural sector, and the self-employed. These categories of workers follow different rules in regard to the use of unemployment benefits and are excluded from our sample.

[8] This is crucial to maintain the assumption about the exogeneity of the benefit process in our empirical model.

of non-participation present in many women's labor histories. We select a 10% random sample to ease the computational burden. After filtering the sample (see Appendix A), we end up with a sample of 32,586 natives, which comprises 115,449 unemployment spells[9] and 176,504 employment spells[10]. Regarding immigrants,[11] we end up with a sample of 4,601 individuals with 16,712 and 21,064 unemployment and employment spells, respectively.

In our data, we identify periods of non-employment using information on the dates in which a firm does not pay Social Security contributions for the worker. Those non-employment spells in which the worker receives unemployment benefits are clearly identified as unemployment spells. However, we cannot distinguish between non-employment spells that correspond to periods of unemployment without benefits and periods of inactivity. We consider all these spells as unemployment spells. Thus, the duration of unemployment for those who exit from unemployment to inactivity is the sum of the duration of the initial unemployment spells and the duration of the spells out of the labor force, as in Tatsiramos (2009).[12] Unemployment spells longer than 24 months and employment spells longer than 42 months are treated as right-censored, due to the relatively small number of observations.

The explanatory variables used in the estimations are described in Appendix A and summary statistics are presented in Table 3. As is often the case with administrative data, the main shortcoming is the lack of some individual's characteristics, such as marital status or number of children. Another caveat is that we cannot measure the educational level of the worker, but only the job qualification. Table 3 shows that more than 31% of natives in our sample re-

[9] Only unemployment spells with durations of longer than 15 days are considered because in Spain, shorter durations correspond generally to job-to-job transitions.

[10] Only employment spells longer than 30 days are considered.

[11] We consider immigrants to be those individuals who reside in Spain but have a different nationality from the European Union (as of 1995) countries.

[12] He performs a sensitivity analysis, treating these spells as right-censored unemployment spells, and finds similar results.

ceive contributive unemployment benefits[13] when starting their unemployment spells, with lower rate for immigrants (approximately 26%). The same dynamic is observed for employment spells: 38% of employed natives receive benefits in the previous unemployment spell, while this rate falls to 30% for immigrants. Average unemployment duration for completed spells is lower for immigrants (3.30 months) than for natives (3.97 months).[14] Immigrants also have smaller employment durations than natives (6.29 versus 6.94 months).

2.2 Empirical Hazards

To obtain an idea of the shape of the distribution of unemployment and employment durations, we look at the empirical hazards. That is, we compute the number of exits from unemployment (employment) in each month divided by the population still in unemployment (employment) at the beginning of that month.

Figure 1, which refers to unemployment spells, shows the empirical hazard for two distinct periods: pre-recession (2000-2007) and recession (2008-2011). This figure confirms the strong decrease in the hazard of leaving unemployment during the first six months. For both natives and immigrants, the hazard rate for the pre-recession period is higher than for the recession period, up to the first year in unemployment. Moreover, the influence of the recession seems to be stronger among immigrants. For instance, an immigrant who remained unemployed for at least 5 months has a probability of leaving unemployment during that month of 16.4% in 2000-2007 and 8.8% in 2008-2011, as opposed to 12.9% and 8.5% for a native.

As to the employment hazard, it is crucial to distinguish between permanent and fixed-term employees. Figure 2 shows that there is no duration dependence

[13] The unemployment spells with unemployment assistance benefits have been censored from the first month they are received because in many cases these spells correspond to periods of inactivity for the long-term unemployed older than 52 who typically link the end of this benefit receipt with their retirement period.

[14] In our sample there is a larger proportion of short unemployment spells than in the LFS, which makes sense given the quarterly structure of the Spanish Labor Force Survey.

for permanent contracts, while for fixed-term contracts there is a negative duration dependence with spikes in the exit rate around the time of contract exhaustion (6, 12, 24 and 36 months).

Figure 3 presents the unemployment empirical hazard by unemployment benefits receipt. The differences between the hazard lines are larger among immigrants only for the first 6-10 months of unemployment. For example, at the fifth month of unemployment, the hazard rates for the average native without and with benefits are 12.2% and 8.6%, respectively. These figures are 12.7% and 8.0% for the average immigrant. After 10 months, the difference between the hazard rates of recipients versus non-recipients is still approximately 6 p.p for natives, whereas for immigrants the difference drops to less than 1 p.p.

Finally, Figure 4 presents the empirical unemployment hazards by time to benefits exhaustion. The hazards of those individuals without unemployment benefits are similar to those for individuals for whom benefits exhaustion is close (1 to 3 months), while among workers with more time before exhausting benefits, the hazard rates are lower up to the end of the first year of unemployment.

3 Empirical Models

We analyze the dependence of the exit from unemployment (employment) on the length of time unemployed (employed) and on other economic variables by the estimation of duration models. At any point in time, an individual may be in any of two states: unemployed (u) or employed (e). We estimate hazard rates between both states for natives and immigrants separately by estimating the probability that an individual will leave unemployment (employment) during the next period, given that she has been unemployed (employed) for T periods. This framework is consistent with the theories of job search (Mortensen, 1977) and job matching (Jovanovic, 1979).

We treat duration (T) as a discrete variable. Thus, the probability of a spell

being completed by time $t+1$ given that it was still continuing at time t is given by

$$\begin{aligned} h^k(t) &= \Pr(T = t \mid T \geq t, b^k(t), x^k(t)) = \\ &= F(\alpha_0^k(t) + \alpha_1^k(t)b^k(t) + \alpha_2^k(t)x^k(t) + \alpha_3^k(t)b^k(t)x^k(t)), \end{aligned}$$

where $k = u, e$ refers to unemployment or employment spells. For the employment hazard we allow for a differential effect of all explanatory variables depending on whether the worker has a temporary or a permanent contract. Therefore, we include among the regressors a dummy variable equal to 1 if the individual has a temporary contract and its interaction with all the conditioning variables in the model.

The analysis is also conditional on $b^k(t)$, a set of variables that capture whether the worker receives unemployment benefits and his benefit entitlement. In the exit from employment, these variables refer to the previous unemployment spell.

It is important to note that the exact benefit entitlement duration is available in our data. In contrast to other studies, this variable is not censored, so the benefit indicator variable can be treated as strictly exogenous and not as a predetermined variable. For instance, in Bover et al. (2002) and Tatsiramos (2009) the exact benefit duration is not observed. What they do observe is whether the benefit entitlement is as long as the unemployment duration. This leads to a lack of strict exogeneity of the benefit indicator and to the necessity of treating this variable as endogenous or predetermined, depending on whether unobserved heterogeneity is accounted for. In our case, the hazards can be conditioned on the exact and known benefit entitlement and we do not need to allow for feedback from T to future values of b.

We also condition on a vector of variables $x^k(t)$, that includes a set of individual, sectorial and aggregate variables, some of which are time invariant, while others, such as business cycle conditions, are time-varying. $\alpha_0^k(t)$ is a parameter

that captures duration dependence and is a function of the number of periods spent in unemployment or employment. $\alpha_1^k(t)$, $\alpha_2^k(t)$ and $\alpha_3^k(t)$ are also functions of t and capture interaction effects between duration and the conditioning variables. Finally, $F(\cdot)$ denotes the logistic cumulative distribution function, $F(z) = \frac{e^z}{(1+e^z)}$.

3.1 Single-Spell Duration Models and Unobserved Heterogeneity

For each individual, our data consist of one or more spells of unemployment and employment. Nonetheless, it is useful to consider first the estimation of a single spell duration model that treats different spells for the same individual as independent, which would be a reasonable assumption in the absence of unobserved heterogeneity. Then, the log likelihood function for all spells of unemployment (employment) would take the form

$$\log L^k = \sum_{i=1}^{N^k} \sum_{t=1}^{\overline{t}^k} \left\{ (1 - y_{it}^k) \log(1 - h_i^k(t)) + y_{it}^k \log h_i^k(t) \right\}, \tag{1}$$

where N^k is the number of unemployment (employment) spells in the sample, $\overline{t}^k$ is the largest observed duration, and y_{it}^k takes the value 1 if an exit from the spell of unemployment (employment) is observed in period t and 0 if not or if the observation is censored at t.

The model could be estimated by Maximum Likelihood (ML).[15] Nonetheless, ML estimates of previous model may be biased by the presence of unobserved heterogeneity. Such unobserved heterogeneity is likely to decrease the effect of benefits and to introduce spurious negative duration dependence. A version of the model allowing for unobserved heterogeneity, η^k, would be given by

$$\begin{aligned} h^k(t,\eta) &= \Pr(T = t \mid T \geq t, b^k(t), x^k(t), \eta^k) = \\ & F(\alpha_0^k(t) + \alpha_1^k(t) b(t) + \alpha_2^k(t) x^k(t) + \alpha_3^k(t) b^k(t) x^k(t) + \eta^k). \end{aligned}$$

[15] Since the hazard rate $h_i^k(t)$ in the likelihood function is a *logit* probability, estimation is equivalent to estimating a sequence of *logit* models (with cross-equation restrictions) defined on the surviving population at each duration (see Jenkins, 1995).

Again, assuming that the transitions across unemployment and employment are independent, the log-likelihood function is

$$\log L^k = \sum_{i=1}^{N^k} \int \sum_{t=1}^{\overline{t}^k} \left[\left\{ (1 - y_{it}^k) \log(1 - h_i^k(t)) + y_{it}^k \log h_i^k(t) \right\} \right] d\mu(\eta_i^k), \qquad (2)$$

where $\mu(\eta_i^k)$ is the unknown distribution of the unobserved heterogeneity for each type of spell (unemployment or employment).

3.2 Multiple-Spell Duration Models

The availability of data on multiple spells for the same individual allows to improve the identification of the parameters of interest in a duration model in the presence of unobserved heterogeneity. Moreover, when several spells of employment and unemployment are observed for each individual, it is possible to relax the assumption of independent spells and to allow for correlation across the spells of unemployment and employment. Specifically, we can jointly estimate the unemployment and employment hazards assuming a joint distribution for the unobserved heterogeneity in each state.

The problem of how to control for the unobserved mixing distribution $\mu(\eta)$ has been addressed extensively in the literature (see Van den Berg, 2001). Heckman and Singer (1984) propose controlling for unobserved heterogeneity without explicitly specifying a parametric distribution for heterogeneity. They adopted a semi-parametric approach to identify the unobserved distribution from a mixed distribution assuming that η is a random effect independent of all individual characteristics, although correlated with $\alpha_0(t)$. For discrete duration models, the only assumption is that the distribution of the unobserved heterogeneity has a finite mean.[16]

We follow Heckman and Singer (1984) and consider that η^u and η^e follow a bivariate discrete distribution and where both η^u and η^e have two location

[16] The performance of estimators that approximate the distribution of unobserved heterogeneity by means of a discrete distribution is studied by, among others, Huh and Sickles (1994), Baker and Melino (2000) and Gaure et al. (2007)

points. Thus, the distribution of the unobserved heterogeneity is specified with four points of support (s_1^u, s_1^e), (s_1^u, s_2^e), (s_2^u, s_1^e), (s_2^u, s_2^e) with the corresponding joint probabilities: $P_{11} = \Pr(\eta^u = s_1^u, \eta^e = s_1^e)$, $P_{12} = \Pr(\eta^u = s_1^u, \eta^e = s_2^e), P_{21} = \Pr(\eta^u = s_2^u, \eta^e = s_1^e)$, and $P_{22} = \Pr(\eta^u = s_2^u, \eta^e = s_2^e)$.[17] Therefore, there are four types of individuals who differ in their unemployment and employment hazards: individuals with high exit rates both from unemployment and employment, individuals with high exit rates from unemployment and low exit rates from employment, individuals with low exit rates from unemployment and high exit rates from employment, and individuals with low exit rates from both states.[18] For identification, without a constant term in the model, we estimate the four mass points and three free probabilities.

Thus, the joint likelihood function is given by

$$\log L = \sum_{i=1}^{N} \sum_{l=1}^{2} \sum_{m=1}^{2} \log L_i(s_l^u, s_m^e) \Pr(\eta_i^u = s_l^u, \eta_i^e = s_m^e),$$

where $\log L_i(s_l^u, s_m^e)$ takes the following form:

$$\log L_i(s_l^u, s_m^e) = \sum_{t=1}^{\bar{t}} \left\{ \begin{array}{c} [u_{it} \{(1 - y_{it}^u) \log(1 - h_i^u(t, s_l^u)) + y_{it}^u \log h_i^u(t, s_l^u)\}] + \\ [(1 - u_{it}) \{(1 - y_{it}^e) \log(1 - h_i^e(t, s_m^e)) + y_{it}^e \log h_i^e(t, s_m^e)\}] \end{array} \right\}, \tag{3}$$

and u_{it} equals 1 if a spell of unemployment is observed during the period t and zero otherwise.

As with linear panel data models, identification of the distribution of the random effects is facilitated by the presence of multiple spells for each individual. This panel aspect of the data allows identification under less demanding conditions relative to the single-spell case (see Abbring and van der Berg, 2003, and van der Berg, 2001). For example, while covariates are essential for identification in single-spell models, multiple-spell models can be identified even if there

[17] Belzil (2001) also uses a bivariate discrete distribution with two points of support to study the effect of UI benefits duration on the quality of subsequent job duration using single spell data.

[18] Notice that this distribution of the unobserved heterogeneity is more flexible than the one in Tatsiramos (2009) who assumes two mass points (s_1^u, s_1^e) and (s_2^u, s_2^e) with probabilities P_1 and P_2.

are no covariates (see Honoré, 1993). Nonetheless, the presence of covariates in a multi-spell duration model can help improve the identification. Specifically, identification is aided by the fact that we have time-changing explanatory variables in all types of spells (see Eberwein et al., 1997).

4 Estimation Results

In this section, we report the estimates for the joint likelihood for unemployment and employment durations, accounting for correlated unobserved heterogeneity as specified in equation 3, for natives and immigrants separately.

The effect of economic conditions is captured by the yearly regional employment growth rate.[19] For the unemployment hazard, the effect of benefits is captured by an unemployment benefit receipt indicator and by a set of variables that capture the time before exhausting the benefits receipt (1 to 3, 4 to 6, and 7 to 12 months). As previously indicated, it is crucial to condition on the benefit entitlement (or its opposite, the time before exhausting the benefits receipt) because it allows us to treat the benefit indicator variable as strictly exogenous. We also allow for an interaction between unemployment benefits receipt and log duration.

For the employment hazard the effect of benefits is captured by a dummy variable which equals 1 for those workers who received benefits in the previous unemployment spell interacted with the entitlement period (1 to 6 or 7 to 24 months). The motivation is to capture a differential effect depending on the potential available time to find a job.[20] We also interact the previous variable with a dummy indicating whether the duration of the current employment spell was between 6 and 12 months. The motivation in this case is to capture potential increases in the hazard rate as workers qualify again for unemployment benefits.

[19] Alternatively, aggregate effects are measured by a dummy variable taking the value 1 if the observation corresponds to the period 2008-2011 and 0 otherwise (these estimates are available upon request).

[20] Tatsiramos (2009) within a similar framework interacts the benefit dummy with previous unemployment duration, because he can not construct the exact benefit entitlement.

The estimates of the effect of economic conditions and benefits are presented in Sections 4.1 and 4.2, respectively, followed by the results for the distribution of unobserved heterogeneity and, finally, by the estimates of the effect of duration and other characteristics. The impact of the variables is discussed in terms of the sign and statistical significance of the estimated coefficients as well as in terms of the predicted hazards for leaving unemployment and employment at different durations. The predicted hazards are computed for each point of support of the heterogeneity distribution and then weighted using the estimated probabilities for each point.

4.1 Economic Conditions

Table 4 presents estimates of the economic conditions for both unemployment and employment hazards. As previously discussed, it is captured by the yearly regional employment growth rate. We allow for an interaction of this variable with log duration and with the unemployment benefit receipt indicator and sectorial dummies for the unemployment and employment hazards respectively.

Our results point to a positive effect of favorable economic conditions on the hazard of leaving unemployment. This positive effect is not constant and decreases with duration[21] (notice the negative coefficient on the interaction between the employment growth rate and log dur). A comparison of the size of the coefficients between natives and immigrants shows that the effect of the business cycle is larger for immigrants and that the decreasing effect with duration is also larger for immigrants.

Table 6 presents the predicted unemployment hazards for different durations evaluated at the mean employment growth rates for two distinct states of the business cycle, before the crisis (before 2008) and afterwards.[22] In accordance with previous estimates, the effect of the economic conditions is larger

[21] These results are in line with Bover et al. (2002).

[22] The mean employment growth rate during the first period is 3.72%, while in the second it is -2.90%.

among immigrants. For instance, the difference in predicted hazards between the expansionary and the recession period at the beginning of the unemployment spell is almost 10 p.p. for natives without benefits and almost 16 p.p. for immigrants. After 6 months in unemployment these figures are approximately 4 p.p. for natives and 7 p.p. for immigrants. After 12 months in unemployment, the differences for immigrants and natives are similar.

As to the employment hazard, Table 4 shows that the exit rate from employment is smaller during the expansion, and again this effect decreases with duration. Our separate estimates for temporary and permanent workers show that favorable economic conditions mainly decrease the probability of leaving permanent employment. Similarly to the unemployment hazard, we find that the effect of the economic cycle is stronger among immigrants than natives, but for immigrants it decreases more rapidly with employment duration.

Predicted hazards from Table 7 show that the difference in the employment hazard rates between the recession and the expansion at the beginning of the spell for a permanent worker without benefits in the previous unemployment spell is approximately 0.35 p.p. for a native and 2 p.p. for an immigrant. After 6 months in employment these figures are approximately 0.25 p.p. for natives and 1.20 p.p. for immigrants.

There also appears to be significant differences across sectors. Table 4 shows that for workers in construction the negative effect of favorable economic conditions in the employment hazard is the largest, both for immigrants and natives. For instance, the difference in the predicted hazards between recession and expansion periods, after 6 months of temporary employment in the industry sector is approximately 4.6 and 6 p.p for natives and immigrants, respectively, while in the construction sector, this figure is between 5.6 and 8 p.p. for natives and immigrants, respectively.

4.2 Unemployment Benefits

Table 5 reports the coefficient estimates of the unemployment benefit variables. As is standard in the literature, our results indicate that the receipt of unemployment beneftis reduces the hazard of leaving unemployment. The comparison of the size of the coefficients shows that this effect is stronger among immigrants, although it decreases with duration at a higher rate than for natives. We also find that the disincentive effect of benefits increases when economic conditions improve, but this effect is statistically significant only for immigrants (see the coefficient of the interaction between receiving unemployment benefits and the employment growth rate in Table 4). The disincentive effect of benefits decreases when the time to exhausting benefits receipt approaches (1 to 3 months).

The overall effects of all these interactions and the rest of variables included in the model in the predicted hazard are shown in Table 6, which presents the predicted unemployment hazard for individuals who do not receive unemployment benefits and for those who do receive them. We consider two different cases: one in which the benefit entitlement is 6 months, and another in which the benefit entitlement is 18 months.[23] The difference between the hazard for an immigrant without and with benefits and with an unemployment duration of 1 month and entitlement period of 18 months is approximately 10 p.p. higher than for a comparable native during the expansion. As unemployment duration increases, this difference decreases; when the unemployment duration is 6 months, the difference between immigrants and natives is approximately 2 p.p. Therefore, we find a stronger disincentive effect of benefits for immigrants but only at short unemployment durations.

For the employment hazard, we find a negative impact of having received benefits during the previous unemployment spell only for native temporary

[23] Note that in this table the variable "time to exhausting" is implicit given the corresponding value of the entitlement and the unemployment duration. For instance, when the worker is in his first month of unemployment and has access to 6 months of entitlement, time to exhausting is equal to 5 months

workers. For temporary immigrants, we do not find any significant effect, while for permanent workers we find that having received benefits with a long benefit entitlement (from 7 to 24 months) increases the hazard of being fired. Therefore, we only find evidence of the so called "matching effect" of unemployment benefits receipt for temporary native workers.

Interestingly, our results not only note the importance of distinguishing between temporary and permanent contracts but also the importance of accounting for the current employment duration. Specifically, estimated coefficients from Table 5 show that the negative effect of previous unemployment benefits for temporary native workers disappears and becomes positive for those workers whose current employment duration is between 6 and 12 months. That is, when the worker becomes eligible again for unemployment benefits there is a spike in the probability of leaving employment. The predicted hazards reported in Table 7 give a magnitude of these effects. A temporary native after 6 months in employment and who received unemployment benefits with a benefit entitlement of 6 or 12 months exhibits a hazard in employment 4 p.p. higher than a non-recipient, while at the beginning of the employment spell this figure is approximately 1 p.p. lower.

4.3 Other Effects

4.3.1 Unobserved Heterogeneity

As previously discussed, the distribution of the unobserved heterogeneity is specified with four mass points (s_1^u, s_1^e), (s_1^u, s_2^e), (s_2^u, s_1^e), (s_2^u, s_2^e), with probabilities $P_{11} = \Pr(\eta^u = s_1^u, \eta^e = s_1^e)$, $P_{12} = \Pr(\eta^u = s_1^u, \eta^e = s_2^e)$, $P_{21} = \Pr(\eta^u = s_2^u, \eta^e = s_1^e)$, and $P_{22} = \Pr(\eta^u = s_2^u, \eta^e = s_2^e)$. Since the model does not include a constant term, the four mass points are identified.

Table 8 shows that of the four unobserved types of workers we have allowed for, the probability of the type with high exit rates both from unemployment and employment is the lowest, especially among natives (9.2% and 14.1% for

natives and immigrants, respectively). Moreover, the probability of having high unemployment and low employment exit rates is approximately 33% for natives and 36% for immigrants. The probability of the type with the "worst" characteristics (low unemployment and high employment hazard rates) is almost 32% for natives and 33% for immigrants.

4.3.2 Duration Dependence

Table B1 in Appendix B reports the coefficient estimates for duration dependence and for the other characteristics included in the model. For the unemployment hazard, duration dependence is parameterized using a third order polynomial in $\log t$. For the employment hazard, we capture duration dependence with the log of duration, because we did not find any significant effect of non-linearities. For temporary contracts, we also include a set of dummy variables to capture the effect of being fired when the contracts usually end (at 6, 12, or 36 months). As previously indicated, additional effects of duration are captured by introducing as regressors the interactions of certain variables with logged duration. In the unemployment equation, we find a negative duration dependence in all cases. In the employment equation, we find a weaker duration dependence for permanent workers than for temporary workers. Moreover, for temporary workers there are spikes in the employment hazards during the months that fixed-term contracts usually end (at 6, 12, and 36 months).

4.3.3 The effect of other characteristics

In the unemployment hazard, the estimated effect of age shows that the unemployed who are above 30 years old have lower exit rates from unemployment, and this effect is stronger as duration increases. The age effect is also stronger among natives than immigrants. The more educated, with a temporary or part-time contract and working in the construction sector during the previous employment spell, are more likely to leave unemployment.

The specification in the employment hazard includes a dummy for a previous unemployment spell of 1-6 months. Once we control for all the rest of variables, short previous unemployment experience is associated with lower hazard out of employment for temporary native workers. For permanent natives, short unemployment duration increases the hazard for subsequent unemployment.[24] For immigrants, we do not find any significant effect of previous unemployment duration. Younger, more educated and full-time workers are less likely to exit employment. There is a large positive effect on the employment hazard for permanent workers in the construction sector, especially if they are immigrants.

5 Conclusions

In this paper, we investigate how immigrants and natives respond differently to changes in the economic conditions due to the 2008 "Great Recession" and to the receipt of unemployment benefits when the economy declines. We focus on unemployment and employment durations as outcomes. A potentially different response of immigrants would have important implications for immigration and welfare policy as well as for the analysis of the assimilation process of immigrants in the host country.

Our findings suggest that immigrants are more sensitive to changes in economic conditions than natives, both in terms of unemployment and employment hazards. The positive effect of favorable economic conditions on the unemployment hazard and its negative effect on the employment hazard is not constant, but decreases with duration at a higher rate among immigrants. This indicates that, although as in line with previous literature (see Barth et al., 2006, or Dustman et al., 2010), we find that immigrants are more sensitive to the economic cycle, they are able to react more quickly than natives to adverse economic conditions. Moreover, the hypothesis presented by Dustman et al. (2010) that

[24] This result is similar to that found by Tatsiramos (2009) for Spain and Italy.

the stronger reaction of immigrants' unemployment to the economic cycle can be explained by higher job separation rates is also corroborated by our results, since we find that the predicted employment hazard rates are higher for immigrants than for natives, even after controlling for observable and unobservable characteristics.

Our results also point to a disincentive effect of unemployment benefits on unemployment duration. This result is in line with the literature (see, for instance, Bover et al., 2002, or Tatsiramos, 2009). We add further evidence on the differential effect for immigrants and natives. We find that for immigrants the disincentive effect of benefits on unemployment exit rates is larger than for natives but only at the beginning of the spell. This could indicate that the possible policy concern about the immigrants' use of public transfers should be checked. Moreover, we find that the disincentive effect of benefits decreases as time to exhausting the benefits approaches and, only for immigrants, increases when economic conditions are better.

Finally, we find evidence of a positive effect of unemployment benefits on subsequent employment duration, but only for native workers with temporary contracts. This result is in line with Tatsiramos (2009) who, using a sample of European countries, finds that there is a beneficial effect and that it is larger in countries with relatively more generous unemployment insurance systems. We add further evidence for Spain accounting for a differential effect for temporary versus permanent workers and for immigrants versus natives and we only find evidence of the "matching effect" for temporary native workers. Nonetheless, even this effect vanishes when current employment duration is between 6 to 12 months; that is, when the worker becomes again eligible to receive unemployment benefits. This result is consistent with that of Rebollo-Sanz (2012), who finds that when an employee again qualifies for unemployment benefits, there is a spike in the probability of leaving employment. From a policy perspective, this

result suggests that the design of the unemployment insurance system should account for potential distortions on firms' and workers' behavior.

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Appendix A: Sample selection and variables definition

Table A1. Sample Selection

	Natives	Immigrants
N^o. Individuals (initial sample)	595,454	67,675
N^o. Individuals dropped due to:		
Age below 18 or above 49	51,475	3,290
Age of the fist job larger than 30 (natives) or 35 (immigrants)	60,850	15,515
Working in agriculture and self-employment	237	216
missing information regarding occupation	6,512	45
entering into unemployment before 1997	105,022	284
duration of unemployment/employment bellow 15/30 days	45,467	2,299
N^o Individuals (final sample)	325,871	46,016

Table A2. Variables Definition

Variable Name	Definition
UB*	The worker receives unemp. benefits
Time to exhausting UB*	N^o of months until UB are exhausted
UB entitlement*	N^o of months the worker is entitled to receive UB
Δ Empl. rate	Annual and regional growth rate of employment
Sector of activity**	Industry, Construction, Non-market services, Market services
Age	18-30, 31-44, 45-49.
Job Qualification**	High, Intermediate, Low
Fired	Non voluntary exit from the previous job
Big firm**	Firm with more than 250 workers
New Firm**	Created 12 or less months before the worker was hired
Private firm**	Firm is not public
Temporary H. Agency**	Coming from a Temporary Help Agency
Type of contract**	Permanent or Temporary
Part-time**	Part-time employment
Total empl.	N^o months of previous employment
Country of origin	Latin-America, Asia, EU-15, USA and Canada new east EU countries (all EU countries not belonging to the EU15), rest of European countries
Regularization	The first spell for the immigrants observed in a regularization year (2000, 2001 and 2005)

*In the current spell for the unemp. hazard; in previous unemp. spell for the empl. hazard. **In the current spell for the empl. hazard; in previous empl. spell for the unemp. hazard.

Appendix B: Additional estimation results

Table B1. Joint Estimates of Logistic Hazards for Leaving Unemployment and Employment

Leaving Unemployment

Variable	Natives Coef.	S.E.	Immigrants** Coef.	S.E.
Duration				
log Dur	-2.194	0.030	-1.712	0.081
(log Dur)^2	1.184	0.027	0.817	0.077
(log Dur)^3	-0.231	0.006	-0.182	0.019
Individual Characteristics				
Age 31-44	-0.148	0.018	-0.045	0.036
Age 45-49	-0.585	0.034	-0.107	0.182
Age 31-44$\times$ logDur	-0.078	0.009	-0.012	0.024
Age 45-49$\times$ logDur	-0.097	0.017	0.075	0.110
High Qualification	0.050	0.019	-0.066	0.077
Interm. Qualification	0.120	0.014	0.149	0.036
High Qualif.$\times$ logDur	-0.001	0.012	0.005	0.054
Interm. Qualif.$\times$ logDur	-0.012	0.009	-0.055	0.026
Total empl.	0.038	0.001	-0.035	0.006
*Conctract and firm Charact.**				
Big firm	0.100	0.014	0.036	0.056
New firm	-0.026	0.011	-0.036	0.026
Private firm	0.445	0.031	0.605	0.177
Permanent contract	-0.340	0.015	-0.208	0.038
Part time employment	-0.229	0.012	-0.238	0.038
Fired	0.150	0.012	0.067	0.030
Temporary H. Agency	0.255	0.015	0.429	0.053
Sector and Quarterly Dummies*				
Industry	0.050	0.014	-0.001	0.046
Construction	0.149	0.012	0.068	0.030
Non-market services	0.025	0.025	-0.403	0.125
First quarter	0.251	0.011	0.347	0.030
Second quarter	0.481	0.011	0.342	0.031
Third quarter	0.270	0.011	0.240	0.030

*In the previous employment spell. **The hazard function includes dummies for region of origin and regularization year.

Table B1 (cont.). Joint Estimates of Logistic Hazards for Leaving Unemployment and Employment

Leaving Employment

	Permanent Empl.				Temporary Empl.			
	Natives		Immigrants*		Natives		Immigrants*	
Variable	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Duration								
log Dur	-0.152	0.023	-0.072	0.045	-0.316	0.009	-0.152	0.022
Dur. Empl. 6 months					0.734	0.018	0.573	0.044
Dur. Empl. 12 months					1.178	0.026	0.993	0.072
Dur. Empl. 36 months					1.030	0.084	1.026	0.284
Dur previous unem. spell 1-6 m.	0.257	0.040	-0.079	0.115	-0.125	0.015	-0.087	0.048
Individual Characteristics								
Age 31-44	1.019	0.071	0.155	0.134	0.404	0.022	0.137	0.043
Age 45-49	3.222	0.126	0.447	2.334	1.145	0.043	1.009	0.228
Age 31-44× logDur	-0.047	0.025	0.027	0.054	0.004	0.011	-0.004	0.027
Age 45-49× logDur	-0.138	0.045	0.586	0.724	0.054	0.021	-0.225	0.140
High Qualification	-0.439	0.079	0.247	0.209	-0.443	0.027	-0.325	0.102
Interm. Qualification	-0.254	0.076	0.331	0.139	-0.102	0.019	-0.066	0.045
High Qualif.× logDur	-0.031	0.030	-0.128	0.086	-0.056	0.015	0.035	0.062
Interm. Qualif.× logDur	0.065	0.029	-0.111	0.057	-0.007	0.011	0.043	0.029
Total empl.	-0.159	0.003	-0.374	0.016	-0.074	0.001	-0.091	0.006
Conctract and firm Charact.								
Big firm	-0.497	0.046	-0.382	0.145	-0.177	0.019	-0.227	0.068
New firm	0.235	0.027	0.431	0.061	0.061	0.013	0.149	0.029
Private firm	-0.013	0.159	-0.888	0.652	0.094	0.039	-0.025	0.180
Part time employment	0.396	0.037	0.227	0.077	0.215	0.016	0.154	0.044
Temporary H. Agency	-0.413	0.112	0.132	0.480	0.014	0.022	-0.090	0.068
Sector and Quarterly Dummies								
Industry	-0.221	0.035	-0.008	0.091	-0.089	0.020	-0.083	0.049
Construction	0.248	0.037	0.432	0.074	0.035	0.015	0.069	0.033
Non-market services	-0.371	0.084	-0.324	0.301	-0.131	0.033	-0.080	0.135
First quarter	-0.012	0.033	-0.135	0.075	-0.318	0.014	-0.393	0.035
Second quarter	-0.040	0.033	-0.112	0.074	-0.142	0.014	-0.205	0.032
Third quarter	-0.014	0.033	-0.101	0.073	0.130	0.013	-0.118	0.032
N^o Obs.	2,195,099		231,996					
Joint Log-likelihood	-429,779.98		-62,731.69					

*The hazard function includes dummies for region of origin and regularization year.

Table 1: Unemployment Rates and Unemployment Duration (months)

	U. Rates		U. Duration					
	Natives	Immig.	Natives			Immig.		
Year			1-6 m.	6-12 m.	+12 m.	1-6 m.	6-12 m.	+12 m.
2000	9.11	13.02	42.14*	15.66	38.78	55.89	18.25	20.73
2001	7.39	11.98	40.83	16.18	34.19	59.91	13.09	22.52
2002	8.13	14.47	44.07	16.56	32.64	52.70	12.64	28.53
2003	8.02	13.01	45.34	16.39	31.39	46.27	15.94	27.94
2004	7.50	10.20	41.79	18.40	31.73	48.57	14.38	28.72
2005	6.46	8.18	47.82	12.78	27.38	66.51	9.61	11.60
2006	5.65	8.81	50.37	11.64	24.53	65.71	13.40	7.88
2007	6.09	11.22	53.29	11.44	21.21	64.10	12.42	9.97
2008	11.27	21.89	57.59	15.46	19.44	66.55	15.71	11.06
2009	15.82	33.15	38.69	21.60	34.48	42.91	25.33	28.17
2010	17.65	31.99	30.69	17.15	46.76	34.80	15.29	45.11
2011	19.88	36.52	30.05	15.07	50.86	28.50	18.04	48.48

Source: Labour Force Survey, 4th term.
*Percentage of unemployed per group and year.

Table 2: Temporary Employment Rates and Employment Duration (months)

	Temporary Employment				Permanent Employment	
	Temp. Emp. Rates		Temp. Emp. Duration (1-12 m.)		Perm. Emp. Duration (1-12 m.)	
Year	Natives	Immig.	Natives	Immig.	Natives	Immig.
2000	31.58	54.67	80.17*	85.08	9.78	28.12
2001	31.04	58.21	74.81	82.01	8.76	32.14
2002	30.10	57.71	74.68	78.73	8.38	29.23
2003	29.39	58.34	74.66	73.93	8.27	24.96
2004	29.13	61.28	75.13	68.57	8.70	23.84
2005	29.74	58.87	82.64	84.13	12.90	35.58
2006	29.79	59.89	81.75	83.30	14.85	39.45
2007	27.60	54.23	81.39	80.35	15.08	35.79
2008	25.19	50.22	80.97	81.41	12.47	31.25
2009	22.01	43.96	81.26	80.86	9.16	23.15
2010	21.98	41.28	79.53	84.02	8.74	20.31
2011	22.35	42.73	79.19	84.20	8.19	17.89

Source: Labour Force Survey, 4th term.
*Percentage of employed per group and year.

Table 3: Descriptive Statistics

	Unemployment Spells		Employment Spells	
	% Natives	% Immig.	% Natives	% Immig.
With Unemployment Benefits	31.20	26.51	38.37	30.50
Sector: Agriculture	0.74	0.79	1.31	1.29
Industry	12.59	8.72	15.94	9.94
Construction	28.61	48.03	28.36	45.61
Non-market services	8.04	2.12	9.32	2.10
Market services	50.02	40.34	45.07	41.06
High qualification	15.17	4.92	22.14	6.13
Intermediate qualification	35.86	31.23	38.03	32.33
Low qualification	48.97	63.85	39.83	61.54
Age 18-30	61.05	51.33	56.73	55.13
Age 31-44	32.28	47.76	37.74	44.25
Age 45-49	6.67	0.91	5.53	0.62
Fired	83.79	75.88	67.32	66.04
Big Firm	12.08	5.67	13.25	5.88
New Firm	19.53	28.79	20.83	27.76
Coming from a Temp. Help Agency	17.48	8.58	14.12	7.26
Permanent contract	11.79	11.85	25.72	18.08
Part-time employment	15.87	13.05	11.12	12.49
Total empl. (months)	87.39	36.03	112.75	37.87
Private firm	93.94	98.62	92.48	98.72
Region of origin				
Africa		38.09		35.12
Latin-America		32.17		33.90
Asia		7.80		8.49
EU-15, USA and Canada		4.63		4.73
New EU countries		14.18		14.50
Rest of Europe		3.13		3.27
Average Duration (months)*	3.97	3.30	6.94	6.29
N^o of Spells	115,489	16,712	176,504	21,064
% of Censored Spells	15.9	19.8	67.7	52.6
N^o of individuals	32,586	4,601		

*Only for compelted spells.

Table 4: Effect of economic conditions on unempl. and empl. hazards

	Natives		Immigrants	
	Coef.	S.E.	Coef.	S.E.
Unemployment				
Δ Empl. rate	0.067	0.002	0.105	0.005
Δ Empl. rate× logDur	-0.009	0.001	-0.018	0.003
Δ Empl. rate×Receiving UB	-0.001	0.003	-0.064	0.010
Permanent Employment				
Δ Empl. rate	-0.037	0.008	-0.079	0.016
Δ Empl. rate× logDur	0.003	0.003	0.020	0.006
Δ Empl. rate×Industry	-0.044	0.008	-0.061	0.020
Δ Empl. rate×Construction	-0.081	0.008	-0.079	0.015
Δ Empl. rate×Non-market serv.	0.006	0.017	0.004	0.052
Temporary Employment				
Δ Empl. rate	-0.032	0.002	-0.056	0.006
Δ Empl. rate× logDur	0.001	0.001	0.014	0.003
Δ Empl. rate×Industry	-0.021	0.004	-0.030	0.011
Δ Empl. rate×Construction	-0.061	0.003	-0.038	0.006
Δ Empl. rate×Non-market serv.	0.008	0.004	0.064	0.022

Table 5: Effect of unemployment benefits on unempl. and empl. hazards

	Natives		Immigrants	
	Coef.	S.E.	Coef.	S.E.
Unemployment				
Receiving UB	-1.209	0.024	-1.445	0.097
Receving UB× logDur	0.183	0.017	0.329	0.053
Time to exhaust. UB 1-3 m.	0.595	0.031	0.609	0.115
Time to exhaust. UB 4-6 m.	-0.051	0.029	0.090	0.104
Time to exhaust. UB 7-12 m.	-0.039	0.026	-0.100	0.098
Permanent Employment				
Received UB×UB Entitl. 1-6 m.	0.020	0.072	0.224	0.164
Received UB×UB Entitl. 1-6 m×Empl.dur. 6-12 m.	0.015	0.135	0.082	0.287
Received UB×UB Entitl. 7-24 m.	0.406	0.050	0.784	0.169
Received UB×UB Empl.dur. 6-12 m.×Empl.dur. 6-12 m.	-0.095	0.087	0.232	0.277
Temporary Employment				
Received UB×UB Entitl. 1-6 m.	-0.099	0.023	0.042	0.055
Received UB×UB Entitl. 1-6 m×Empl.dur. 6-12 m.	0.389	0.037	0.224	0.096
Received UB×UB Entitl. 7-24 m.	-0.069	0.021	0.081	0.065
Received UB×UB Empl.dur. 6-12 m.×Empl.dur. 6-12 m.	0.271	0.034	0.139	0.111

Note: Joint estimates of the unemployment and employment hazards, allowing for correlated unobserved heterogeneity.

Table 6: Predicted Unemployment Hazards for a Reference Individual.

	Natives				Immigrants			
	Unempl. Duration (months)				Unempl. Duration (months)			
	1	6	12	18	1	6	12	18
Period 2000-2007								
Not Receiving UB	46.73	16.56	13.26	9.67	54.62	20.41	12.89	7.94
	(0.26)	(0.16)	(0.15)	(0.15)	(0.78)	(0.57)	(0.52)	(0.47)
Receiving UB	21.30	13.23	13.26	9.67	21.12	16.86	12.89	7.94
(Entitl. 6 m.)	(0.35)	(0.27)	(0.15)	(0.15)	(1.03)	(1.05)	(0.52)	(0.47)
Receiving UB	22.12	8.09	6.81	9.10	19.73	10.16	7.41	10.04
(Entitl. 18 m.)	(0.40)	(0.18)	(0.19)	(0.32)	(1.57)	(0.93)	(0.74)	(1.24)
Period 2008-2011								
Not Receiving UB	36.84	12.54	10.27	7.55	38.69	13.79	9.00	5.67
	(0.31)	(0.14)	(0.13)	(0.13)	(0.77)	(0.38)	(0.31)	(0.29)
Receiving UB	15.04	9.76	10.27	7.55	17.14	11.18	9.00	5.67
(Entitl. 6 months)	(0.30)	(0.20)	(0.13)	(0.13)	(0.83)	(0.63)	(0.31)	(0.29)
Receiving UB	15.68	5.85	5.07	6.95	15.96	6.53	4.33	5.68
(Entitl. 18 months)	(0.33)	(0.13)	(0.14)	(0.25)	(1.30)	(0.58)	(0.37)	(0.63)

Notes: The reference individual has the mean values of the sample variables for natives and immigrants. St. errors (between brackets) calculated by simulation from the empirical distribution of the parameters.

Table 7: Predicted Employment Hazards for a Reference Individual.

	Natives				Immigrants			
	Empl. Duration (months)				Empl. Duration (months)			
	1	6	12	18	1	6	12	18
Period 2000-2007								
Permanent contract								
Not Received UB	0.67	0.51	0.45	0.43	2.07	1.93	1.88	1.86
	(0.06)	(0.04)	(0.04)	(0.04)	(0.64)	(0.61)	(0.60)	(0.60)
Received UB	0.68	0.52	0.47	0.44	2.57	2.61	2.54	2.31
(Entitl. 6 months)	(0.07)	(0.07)	(0.07)	(0.05)	(0.91)	(1.02)	(1.00)	(0.81)
Received UB	1.00	0.69	0.62	0.64	4.40	5.14	5.02	3.96
(Entitl. 18 months)	(0.41)	(0.17)	(0.18)	(0.30)	(1.52)	(1.90)	(1.87)	(1.35)
Temporary contract								
Not Received UB	12.98	14.70	17.52	5.59	9.23	13.34	17.97	7.39
	(1.08)	(1.21)	(1.41)	(0.52)	(3.22)	(4.44)	(5.71)	(2.66)
Received UB	11.93	18.56	21.90	5.10	9.59	16.65	22.11	7.68
(Entitl. 6 months)	(1.02)	(1.51)	(1.73)	(0.48)	(3.35)	(5.42)	(6.77)	(2.77)
Received UB	12.24	17.31	20.50	5.25	9.92	16.03	21.35	7.95
(Entitl. 18 months)	(1.04)	(1.41)	(1.63)	(0.49)	(3.46)	(5.29)	(6.64)	(2.86)
Period 2008-2011								
Permanent contract								
Not Received UB	1.02	0.75	0.66	0.62	4.17	3.12	2.79	2.61
	(0.09)	(0.06)	(0.06)	(0.05)	(1.28)	(0.94)	(0.85)	(0.82)
Received UB	1.04	0.77	0.69	0.63	5.15	4.19	3.75	3.24
(Entitl. 6 months)	(0.12)	(0.11)	(0.10)	(0.07)	(1.72)	(1.58)	(1.43)	(1.10)
Received UB	1.52	1.02	0.90	0.93	8.64	8.11	7.29	5.52
(Entitl. 18 months)	(0.15)	(0.11)	(0.10)	(0.08)	(2.73)	(2.84)	(2.59)	(1.80)
Temporary contract								
Not Received UB	17.05	18.92	22.20	7.40	13.45	16.57	20.94	8.52
	(1.35)	(1.47)	(1.68)	(0.67)	(4.44)	(5.28)	(6.37)	(3.01)
Received UB	15.74	23.54	27.32	6.76	13.94	20.48	25.53	8.85
(Entitl. 6 months)	(1.29)	(1.78)	(1.99)	(0.63)	(4.60)	(6.31)	(7.32)	(3.14)
Received UB	16.13	22.06	27.70	6.95	14.39	19.75	24.69	9.16
(Entitl. 18 months)	(1.30)	(1.68)	(1.90)	(0.64)	(4.73)	(6.18)	(7.30)	(3.25)

Notes: The reference individual has the mean values of the sample variables for natives and immigrants. St. errors (between brackets) calculated by simulation from the empirical distribution of the parameters.

Table 8: Heterogeneity Parameters.

	Natives		Immigrants	
	Coef.	S.E.	Coef.	S.E.
Support Points				
s_1^u	-0.673	0.040	-0.712	0.189
s_2^u	-1.787	0.038	-1.729	0.188
s_1^e	-2.639	0.175	-1.109	0.665
s_2^e	-3.682	0.175	-1.947	0.666
Probabilities				
P_{11}	0.077	0.006	0.128	0.028
P_{12}	0.291	0.008	0.313	0.032
P_{21}	0.312	0.011	0.365	0.042
$1 - P_{11} - P_{12} - P_{21}$	0.320		0.193	

Figure 1: Empirical Unemployment Hazards, by period

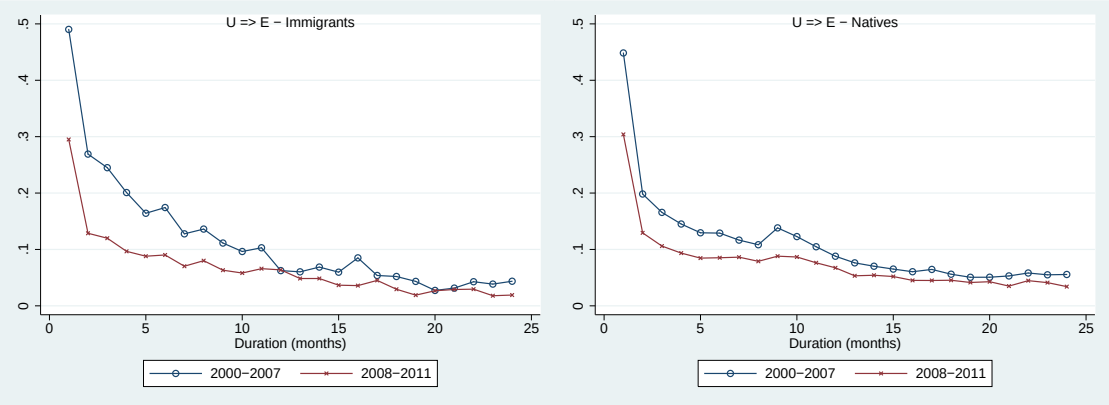

Figure 2: Empirical Employment Hazards, by period

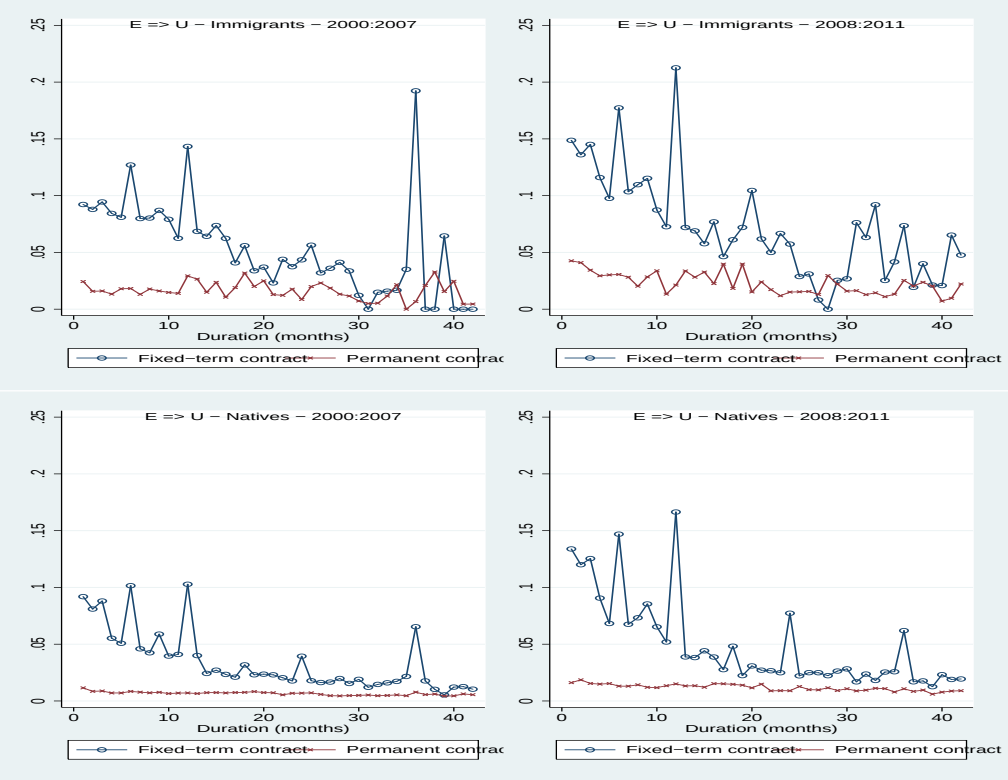

Figure 3: Empirical Unemployment Hazards and Unempl. Benefits Receipt

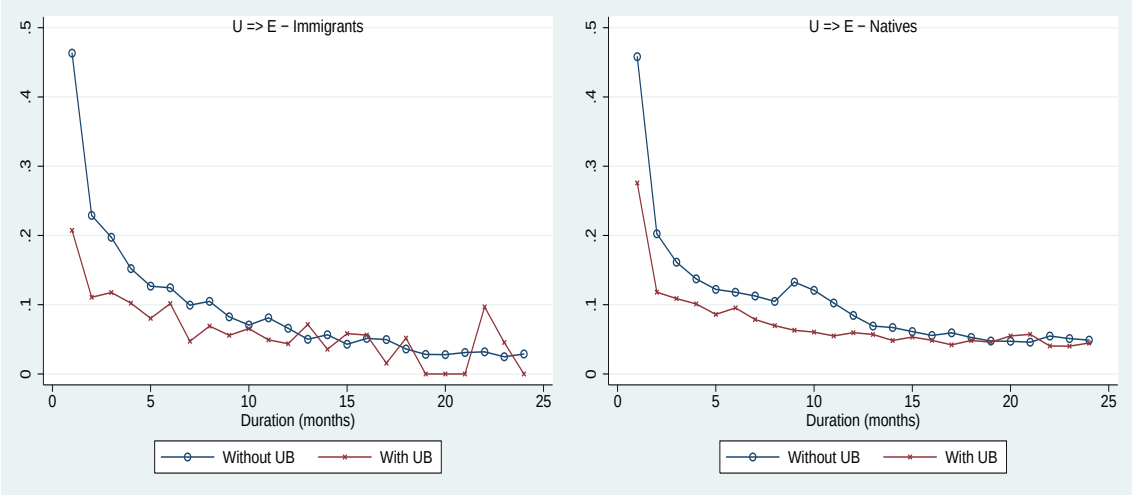

Figure 4: Empirical Unemployment Hazards and Time to Exhaust. Benefits