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EMPLOYMENT DYNAMICS OF IMMIGRANTS VERSUS NATIVES: EVIDENCE FROM THE BOOM-BUST PERIOD IN SPAIN, 2000–2011

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This article studies whether the durations in unemployment and employment for immigrants and natives respond differently to changes in economic conditions and to the receipt of unemployment benefits. Using Spanish administrative data for the period 2000–2011, we estimate 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. The effect of the business cycle is not constant but decreases with duration at a higher rate among immigrants. We provide evidence that the higher job separation rates and lower capital-labor complementarity of immigrants are mechanisms that are possibly compatible with these results. We also find evidence of a disincentive effect of unemployment benefits on unemployment duration, which is stronger for immigrants, but only at the beginning of the unemployment spell, especially under good economic conditions. Finally, unemployment benefits increase job match quality only for native workers with temporary contracts. (*JEL* J64, J61, C23, C41, J65)

I. INTRODUCTION

The economic 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, e.g., Baker and Benjamin 1995; Borjas and Hilton 1996; or Hansen and Lofstrom 2003). Another strand of the literature has studied how immigrants respond to the economic cycle compared to natives. For instance, Bratsberg, Barth, and Raaum (2006) examine the relationship between local labor market conditions and the wages of immigrants and natives in the United States, and Dustman, Glitz, and Vogel (2010) study unemployment and wage responses to economic shocks for immigrants relative to natives in Germany and the United Kingdom.

This study contributes to the literature by focusing on unemployment and employment durations. Specifically, we investigate whether durations in unemployment and employment for immigrants and natives respond differently to changes in the economic conditions during the "Great Recession" and to the receipt of unemployment benefits. Given the dual structure of the Spanish labor market (see Bentolila et al. 2012b), permanent and temporary workers are analyzed separately.

The effect of the severe worldwide economic downturn in the late 2000s is an issue of

ABBREVIATIONS

LFS: Labor Force Survey
MCVL: *Muestra Continua de Vidas Laborales*
OECD: Organization for Economic Co-operation and Development
p.p.: Percentage Points
p.y.s.: Per Year of Service

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social and political concern. This is a situation of particular interest as it could have dramatic consequences and long-lasting effects. All demographic groups have experienced job losses, but one that has been particularly hard-hit is that of immigrants. Given that in most European countries, the share of immigrants has increased considerably, analyzing their relative economic performance under economic shocks would be useful for the analysis of the economic assimilation of immigrants. As Bratsberg, Barth, and Raaum (2006) point out, the assumption made in some empirical studies that time effects are equal for natives and immigrants may lead to severe bias in the estimates of assimilation effects.

With the emergence of the Great Recession, the design of unemployment insurance is also at the heart of the political debate. There is a concern that excessive participation in welfare might be a more common phenomenon for immigrants than for natives (see Boeri, Hanson, and McCormick 2002) and therefore that immigration may increase pressure on the sustainability of the welfare state. In this study, we analyze the effect of unemployment benefits not only on unemployment duration but also on subsequent employment duration. As Tatsiramos (2009) notes, the latter effect could be important because the receipt of unemployment benefits may improve the matching of the unemployed to job vacancies and may therefore increase subsequent employment stability.

Spain is an interesting case in which to investigate these issues. Firstly, Spain experienced a rather exceptional period of economic growth before 2008 (with annual GDP growth rates of approximately 4% and decreasing unemployment rates) as well as an exceptional economic downturn afterward, with one of the highest unemployment rates in the European Union (above 25% in 2011). Secondly, in terms of magnitude, Spain received more immigrants in relative terms than any other Organization for Economic Co-operation and Development (OECD) country between 1998 and 2007 and was second only to the United States in absolute terms during this period: The foreign-born population living in Spain surged from approximately 600,000 (1.5% of the total population) in 1998 to more than 5.7 million (12.2% of the total population) in 2011. The large magnitude of this immigration shock may significantly impact the evolution of the labor market.

The empirical analysis is performed using administrative data, the *Continuous 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 prerecession years (up to 2008) and the recession years, which allows us to assess the effect of changes in economic conditions. Second, it offers information on multiple spells of unemployment and employment for the same individuals. 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-spell discrete time duration models[1] for male immigrants and natives separately. Unemployment and employment hazards are estimated by maximum likelihood, assuming that the distribution of the unobserved heterogeneity is discrete with finite support (see Heckman and Singer 1984). The support-point approach with multiple spells improves the identification of the parameters of interest with respect to the single-spell case. It also makes it possible to allow for correlation across the unobserved variables that influence both unemployment and employment durations.

Consistent with the previous literature, our results indicate that better economic conditions lead to a higher exit rate from unemployment and a lower exit rate from employment. This effect is stronger for immigrants than for natives and 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 an unemployment spell. Only for immigrants, we also find that the disincentive effect of benefits becomes more negative under good economic conditions than in recession periods. Finally, unemployment benefits increase job match quality, but only for native workers with temporary contracts. Nonetheless, this effect vanishes as workers requalify to receive unemployment benefits.

We discuss some possible mechanisms explaining the differences found between immigrants and natives. It does not appear that our

1. Some recent studies that estimate duration models using Spanish data are Bover, Arellano, and Bentolila (2002), Güell and Hu (2006), or Jenkins and García-Serrano (2004), among others.

results on the effect of economic conditions are mainly driven by selective migration or differences in spatial and sectorial distribution between both groups of workers. The pattern observed in our data is more compatible with differences in job separation rates and in the complementarity of immigrants and natives to capital. Differences in the disincentive effect of benefits for immigrants and natives can be related to differences in additional sources of income provided by family networks between these two groups of workers.

The rest of the study is organized as follows: Section II provides a theoretical framework for the empirical analysis; Section III presents some relevant features of the Spanish labor market and Section IV describes the data; Section V formulates the econometric model and the estimation procedure; Section VI discusses the estimation results; Section VII presents possible explanations for our findings, and Section VIII concludes.

II. THEORETICAL FRAMEWORK

The exit from unemployment has traditionally been studied using the partial equilibrium search model.[2] Within this framework, the unemployment hazard rate is the product of the probability of receiving a job offer and the probability of accepting it. The former is a function of the level of demand and of the search activity of job seekers. The latter depends on the probability that the wage offer is higher than the reservation wage. As shown for instance by McCall (1970), the reservation wage is increasing in the level and the duration of unemployment benefits, b,[3] and in the value of the job offer arrival rate, λ, and decreasing in the value of the interest rate, r, and the job firing rate, f. Thus, the exit from unemployment is larger the lower b is and the larger r and f are. The effect of λ is a priori ambiguous but, as shown for example by Cahuc and Zylberberg (2004), if the frequency with which job offers arrive has little effect on the reservation wage, the unemployment hazard rate increases with λ.

All previous elements are likely to depend on a worker's characteristics. In particular, focusing on the two groups of workers analyzed in this study, immigrants and natives, differences in job offer arrival rates, firing rates, and the use of unemployment benefits between them might lead to differences in their exit from unemployment. For instance, if immigrants had lower job offer arrival rates and larger firing rates and if the use of unemployment benefits is smaller than it is for natives, the exit from unemployment will be larger or smaller for the immigrant group depending on the strength of previous factors.[4] Moreover, if immigrants mainly find jobs in highly procyclical activities, we could expect that the dependence of the exit from unemployment with respect to the business cycle is stronger among them.[5]

Apart from the countercyclical pattern of the job firing rate, the transition from employment to unemployment is affected by the receipt of unemployment benefits in a previous unemployment spell. In the equilibrium search model with an endogenous job destruction rate (see Mortensen and Pissarides 1999), more generous unemployment benefits exert an upward pressure on wages, making jobs less profitable. Moreover, the receipt of unemployment benefits may improve the quality of the match between workers and firms (Tatsiramos 2009), leading to more employment stability. Therefore, to the extent that the use of unemployment benefits differs among immigrants and natives, we can also find differences in the employment durations among them.

III. INSTITUTIONAL FRAMEWORK AND STYLIZED FACTS

In this section, we present several background facts on the immigration, employment legislation, and unemployment benefit system in Spain.

A. *Immigration to Spain*

The foreign population in Spain has surged from approximately 1% of the total population in

2. See Rogerson, Shimer, and Wright (2005) for a comprehensive review of search models.

3. See Tatsiramos and van Ours (2012) for a review of the theoretical and empirical evidence of the effects of the design of unemployment insurance on both unemployment and employment durations.

4. Larger firing rates among immigrants will also make decreasing unemployment benefits have stronger effects on workers' acceptance decisions. Therefore, we find that they exit from unemployment at a higher rate as the unemployment spell lengthens (see García-Pérez 2006).

5. All of these results are conditional on a lack of differences in the distribution of the wages offered to immigrants and natives. If this was not the case, there could be additional ways in which the exit from unemployment may differ between these two worker groups. However, the only way to disentangle the differential effect of the parameter of the model on workers' unemployment durations is by the structural estimation of it, which is out the scope of this study.

1991 to 12.2% in 2011. This increase is among the largest within the European countries (smaller countries such as Luxembourg or Cyprus experienced similar rate increase in certain periods). Immigration flows started to increase around 1996 and accelerated from 2000. According to the Census data, there is a clear regional concentration of immigrants in Madrid and the Eastern part of Spain. South America and Africa are the main areas of origin of the immigrants living in Spain (with weights of approximately 30% and 20%, respectively).

Non-EU immigrants are required to obtain a work permit if they intend to be either employed or self-employed.[6] Regarding the process that leads to awarding work permits, in the case of an initial authorization, the employer that intends to employ an immigrant should request a work permit. Among other documents, the employer has to prove that he has communicated a job offer in the Public Employment Services and that he has obtained negative results for this offer. In the case of renewals or self-employees, the immigrant worker should request the authorization and government authorities should then decide whether to grant the work permit or not. There are several types of work permits with different durations and restrictions regarding the sectorial and geographical scopes in which the immigrant is allowed to work.[7] Although there has not been an active policy aimed at attracting immigrants, several amnesties have granted legal residence to illegal immigrants (1996, 2000, and 2005).

B. Employment Legislation and the Unemployment Benefit System

The Spanish labor market is characterized by marked contractual dualism. Spain is one of the European countries in which governments have more strongly promoted temporary contracts with the purpose of increasing labor market flexibility and reducing unemployment.[8] This process started in 1984, when fixed-term contracts were liberalized so that firms could hire fixed-term employees subject to a low severance pay. After this reform, the incidence of temporary work in Spain rapidly increased, exceeding 30% in the early 1990s.[9] Several labor market reforms have aimed at fighting the prevalence of temporary employment, but they have not been very successful (the share of temporary workers by the mid-2000s reached approximately 33% of employees).

As for the Unemployment Benefit System, unemployed workers in Spain are covered by two successive benefits:[10] a contributory unemployment insurance benefit for 4–24 months depending on contributions and an assistance benefit for 3–30 months. Unemployment insurance can be paid to a registered unemployed person aged 16–65 years who is available and actively seeking work and who did not leave her previous job voluntarily. A claimant must have contributed for a minimum of 1 year in the 6 years preceding the legal status of unemployment. The replacement ratio is equal to 70% of the average gross earnings over the previous 6 months for a maximum period of 6 months and then 60% of reference earnings for the remaining period of the benefits.[11] Benefit length increases in steps implying durations that go from 22% to one-third of the contribution period, which has to be of at least 12 months with a maximum of 2 years.

The Unemployment Assistance grants income to those workers between 16 and 65 years old with dependents who have exhausted their entitlement to contributory benefits and to those with no entitlement to contributory benefits but who paid contributions for 3 months. This figure is 80% of the so-called "Multi-Purpose Public Income Indicator," which has amounted to 426 Euros since 2010. In general, the duration is 6 months, which may be extended for a further two periods of the same duration up to a maximum of 18 months. For persons over 52 years, this benefit continues as long as necessary until the claimant either re-enters the workforce or reaches the statutory retirement age, at which point she is eligible for a contributory retirement pension.

6. According to OECD data, a large proportion of the foreign-born labor force in most OECD countries is illegal or undocumented (this is the case for 63.5% of foreign residents in the United States, 25.6% in Italy, 21.2% in the United Kingdom, and 13.4% in Spain). In the following, we have performed some robustness checks to analyze if our results are affected by this issue.

7. See OECD (2008) for details.

8. See Bentolila, Dolado, and Jimeno (2012a) for details.

9. These contracts were subject to a severance pay of 8–12 days per year of service (p.y.s.), while the end of a permanent contract was subject to 20 days' wages p.y.s. with a maximum of 12 months in the case of fair dismissal and 45 days of wages p.y.s. with a maximum of 42 months in the case of unfair dismissal.

10. For a detailed description, see Bentolila et al. (2012a).

11. The benefit is limited by a maximum and a minimum that depend on the number of dependent children below 25.

TABLE 1
Unemployment Rates and Unemployment Duration (months)

Year	U. Rates		U. Duration (distribution within each category and year)[a]					
	Natives	Immig.	Natives			Immig.		
			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
2002	8.13	14.47	44.07	16.56	32.64	52.70	12.64	28.53
2005	6.46	8.18	47.82	12.78	27.38	66.51	9.61	11.60
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
2011	19.88	36.52	30.05	15.07	50.86	28.50	18.04	48.48

Source: Labour Force Survey, 4th term.
[a]Percentage of individuals employed between 1 and 12 months. These figures do not add to 100 because those workers that already had a job at the moment of the interview are not considered. For these workers, the survey does not provide the unemployment duration.

TABLE 2
Employment Rates and Employment Duration (Months)

	Temporary Employment				Permanent Employment	
	Temp. Emp. Rates		Temp. Emp. Duration[a]		Perm. Emp. Duration	
Year	Natives	Immig.	Natives	Immig.	Natives	Immig.
2000	31.58	54.67	80.17	85.08	9.78	28.12
2002	30.10	57.71	74.68	78.73	8.38	29.23
2005	29.74	58.87	82.64	84.13	12.90	35.58
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
2011	22.35	42.73	79.19	84.20	8.19	17.89

Source: Labour Force Survey, 4th term.
[a]Percentage of individuals with an employment duration of less than 12 months per group and year.

C. Some Stylized Facts

The evolution of the 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 2000–2007 period, the unemployment rates among male immigrants were approximately 4 percentage points (p.p.) higher on average than for natives. However, the difference increases to 15 p.p. on average during the 2008–2011 period. 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, Table 2 shows that the share of temporary workers among natives is approximately 33% of employees on average, while among immigrants, this proportion increases to 55%. Immigrants have shorter employment durations than native workers in both temporary and permanent employment.

Regarding unemployment insurance, 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 was 12 p.p., while for immigrants, the increase was approximately 26 p.p.

IV. THE DATA

Our data come from the *Continuous Sample of Working Histories* (*Muestra Continua de Vidas Laborales*, MCVL, in Spanish). It is a micro-level dataset built on Spanish administrative records. 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% nonstratified 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.[12]

The MCVL reconstructs the labor market histories of the individuals in the sample back to 1967 (although earnings data are available since 1980). Therefore, we have information on the entire labor history of the workers registered with the Social Security Administration during the year the sample 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 remains 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),[13] so that only those workers not registered with the Social Security Administration for at least 1 day in the 2006–2011 period are excluded from our sample.

Although the labor market histories of the individuals and earnings can be reconstructed 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 information on individuals who are registered with the social security administration in the years 2000–2011. This means that the spells that end before 2000 are dropped from our sample, and for spells that started before 2000 and are ongoing afterward, we use only the 2000–2011 monthly observations.

We exclude from our sample workers who are not enrolled in the general regime of the Social Security Administration.[14] We also drop male workers for whom the first employment spell is observed after the age of 30 (35 in the case of immigrants) as the labor market history of many of these individuals is likely to be incomplete, especially if this spell took place before year 2000; in this way, we minimize the probability of having missing employment spells in the sample. We keep the spells up to age 49 to avoid the effect of early retirement benefits (available after 2 years of contributive benefits at age 52). Moreover, as unemployment durations of longer than 24 months are treated as right-censored due to the small number of observations (see below) and our period of analysis of 2000–2011, the unemployment spells starting before the end of 1997 are not considered. Finally, women are excluded to avoid the problem of nonparticipation that is present in many females' labor histories. We select a 10% random sample for natives and a 50% random sample for immigrants 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 and 176,504 employment spells).[15] Regarding immigrants,[16] we end up with a sample of 23,016 individuals with 82,940 and 105,838 unemployment and employment spells, respectively.

Periods of nonemployment are identified using information on the dates in which the firm does not pay Social Security contributions to the worker. Those nonemployment spells in which the worker receives unemployment benefits are clearly identified as unemployment spells, which may continue being observed after such benefits are exhausted as long as the worker exits to a new job. Given that the dataset contains all of the social security payments made by the firms, we can compute the exact entitlement to unemployment benefits for each unemployment spell, what is crucial to maintain the assumption about the exogeneity of the benefit process in our empirical model. However, we cannot distinguish between nonemployment spells that correspond to periods of unemployment without benefits and periods of inactivity. We consider all of these spells as unemployment spells. Thus,

12. Given the characteristics of the data set, we only have information on the formal sector and, therefore, illegal immigrants are excluded from our sample. It is difficult to infer how our results would have changed if this group were included. Another potential limitation is that we do not have information on the reception of unemployment benefits while working informally. To the extent that the prevalence of this differs for natives and immigrants, the estimation of the effect of unemployment benefits on unemployment duration could be affected.

13. The first wave is not fully comparable to the others, and the 2005 wave is not used to reduce the size of the data set.

14. 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 the use of unemployment benefits and are excluded from our sample.

15. Only employment spells longer than 30 days and unemployment spells longer than 15 days are considered. In Spain, shorter unemployment durations typically correspond to job-to-job transitions.

16. Immigrant status is defined by having a nationality different from the European Union (as of 1995) countries. EU-15 workers are considered as natives, as their main characteristics and outcomes in our sample are similar to those of natives.

TABLE 3
Descriptive Statistics

	Period 2000–2007				Period 2008–2011			
	Unemployment Spells		Employment Spells		Unemployment Spells		Employment Spells	
	% Natives	% Immig.	% Natives	% Immig.	% Natives	% Immig.	% Natives	% Immig.
With unemployment benefits[a]	25.89	18.76	32.18	19.27	42.31	34.34	55.02	45.66
Sector[b]								
Agriculture	0.58	1.01	0.64	1.16	1.07	1.79	1.30	1.88
Industry	13.22	9.49	16.93	11.00	11.28	8.11	12.64	8.77
Construction	29.50	49.84	29.91	48.24	26.74	44.16	23.20	38.27
Nonmarket services	7.16	1.50	8.17	1.45	9.90	2.80	13.15	3.48
Market services	49.54	38.16	44.35	38.15	51.01	43.14	49.70	47.59
High qualification[b]	13.76	3.90	21.03	5.11	18.13	6.30	25.87	8.51
Intermediate qualification	34.50	28.92	37.97	31.01	38.70	32.32	38.22	33.43
Low qualification	51.74	67.17	41.00	63.88	43.17	61.38	35.90	58.06
Age 18–30	64.84	56.47	58.81	58.95	53.14	48.41	49.77	51.42
Age 31–44	29.50	42.89	36.21	40.59	38.08	50.81	42.86	48.00
Age 45–49	5.65	0.64	4.98	0.46	8.79	0.78	7.36	0.58
Fired	80.53	66.88	67.24	62.69	90.60	84.61	67.59	70.52
Big firm[b]	11.47	5.43	11.97	5.54	13.37	6.04	17.54	7.07
New firm	20.92	30.16	21.74	28.78	16.62	25.49	17.77	24.36
Coming from a Temp. Help Agency	17.72	9.88	13.10	7.89	17.00	8.79	17.52	7.86
Permanent contract[b]	9.93	9.54	26.42	17.60	15.69	14.09	23.39	18.65
Part-time employment[b]	14.49	9.93	9.60	9.08	18.76	17.30	16.16	18.83
Total empl. (months)	77.85	28.32	109.74	33.38	107.32	42.00	122.77	44.11
Private firm[b]	94.66	99.11	93.41	99.22	92.43	97.90	89.38	97.44
Region of origin								
Africa		43.77		38.25		30.54		27.20
Latin-America		29.81		32.82		33.65		34.54
Asia		7.87		8.04		7.97		9.77
EU-15, USA, and Canada		4.59		4.57		4.41		4.60
New EU countries		10.83		12.87		19.61		20.24
Rest of Europe		3.14		3.44		3.81		3.65
Average duration (months)[c]	3.65	2.59	6.64	5.97	4.73	4.20	7.54	6.80
No. spells	78,088	42,205	135,734	61,600	37,371	39,461	40,770	38,895

[a]Current spell for the unemployed and to the previous spell for the employed.
[b]Current spell for the employed and to the previous spell for the unemployed.
[c]Only for completed spells.

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).[17] Unemployment spells longer than 24 months and employment spells longer than 42 months are treated as right-censored, due to the small number of observations.

As the data are collected by the Social Security Administration, the scope for measurement errors in the duration of the spells is small.[18] Of course, administrative data also present problems as certain information is gathered as a byproduct of the administrative process and is less accurate than the information that typically comes from survey data. For instance, we only have information on the job qualifications and not on the educational attainment of the individual. We also lack some individuals' characteristics, such as marital status or the number of children.

The explanatory variables used in the estimations are defined in Appendix A, and summary statistics are presented in Table 3. It shows that before the crisis almost 26% of natives and 19% of immigrants received contributive

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

18. Abowd and Stinson (2013) recognize the potential presence of measurement errors in administrative data and find that administrative data on annual job earnings contain fewer errors than survey data.

unemployment benefits when starting their unemployment spells,[19] while during the crisis, these figures increase 16 and 15 p.p., respectively. Average unemployment duration for completed spells is lower for immigrants before the crisis (2.59 months) than for natives (3.65 months), while during the crisis, both figures become similar (4.73 and 4.20 months, respectively).[20]

A. *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 and those from employment in each month divided by the population still in unemployment or in employment at the beginning of that month.

Figure 1 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 prerecession period is higher than that for the recession period, up to the first year in unemployment. Moreover, the incidence of the recession appears 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 17.5% in 2000–2007 and 8.7% in 2008–2011, as opposed to 12.9% and 8.5%, respectively, for a native.

As for the employment hazard, it is crucial to distinguish between permanent and fixed-term employees. Figure 2 shows that there is no duration dependence 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 the receipt of unemployment benefits. 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, the hazard rates for the average native without and with benefits are 12.2% and 8.6%, respectively. These figures are 13% and 8.2% for the average immigrant. After 10 months, the difference between the hazard rates of recipients versus nonrecipients is still approximately 6 p.p. for natives, whereas for immigrants, the difference drops to 2.2 p.p.

V. EMPIRICAL MODELS

We analyze the dependence of the exit from unemployment and from wage-employment on the length of time unemployed or 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 the probability that an individual will leave unemployment or employment during the next period, given that she has been unemployed or employed for t periods. The unemployment and employment spells that end in other states are treated as right-censored. This includes exits into self-employment, public employment, or the agricultural sector. It also includes the individuals who leave the sample after becoming unemployed.[21] Unemployment and employment durations are also right-censored when the individual is still unemployed or employed at the time the observation period ends.

We treat duration (T) as a discrete variable. The probability of a spell being completed by time $t+1$, given that it was still continuing at time t, is given by

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

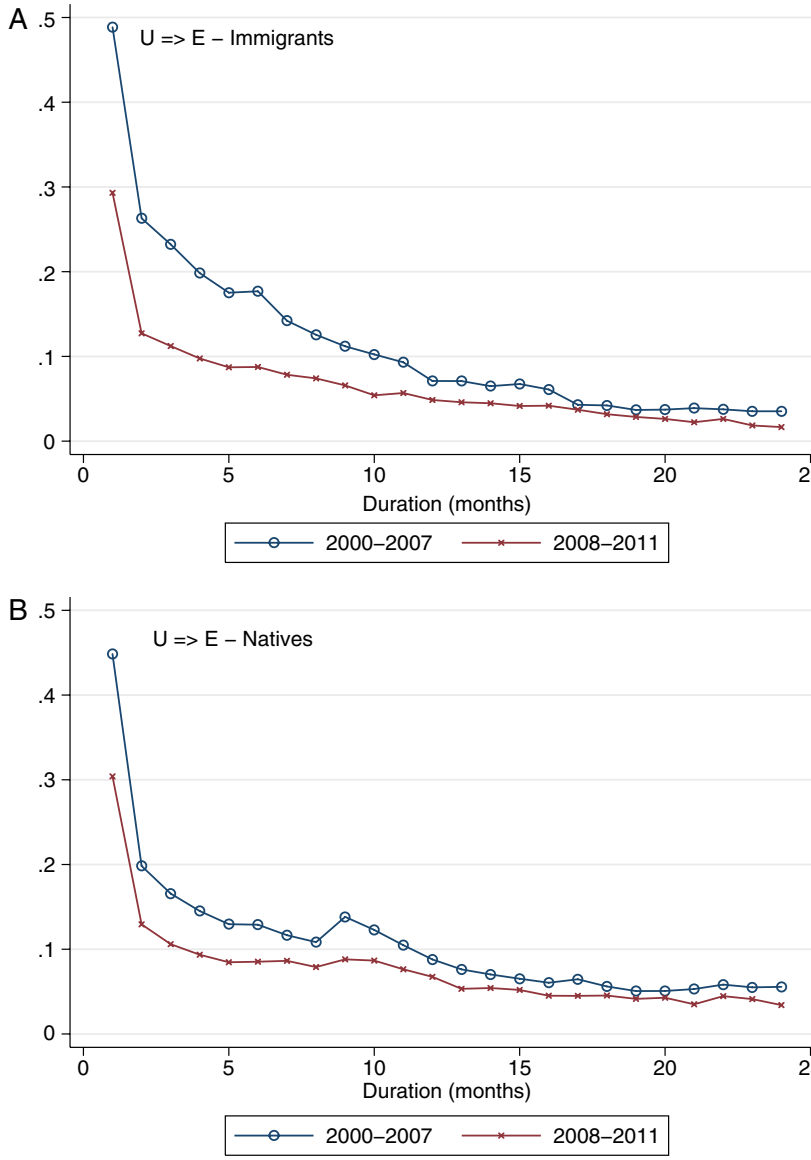
where $k = u, e$ refers to unemployment or employment spells. For the employment hazard, we allow for a differential effect of all explanatory variables depending on whether the worker has a temporary or a permanent contract.

19. We just focus on the unemployment spells in which the individual receives contributive benefits. The spells with unemployment assistance benefits have been censored. The reason is that the exit from the state "unemployed with contributive benefits" to the state "unemployed with assistance benefits" should be treated as an additional transition, and in this study, we are mainly interested in the transitions from unemployment without and with contributive benefits to employment.

20. 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 LFS.

21. This could be a particularly important issue for immigrants who return to their home countries. Actually, the percentage of censored natives in our sample is 15.7%, while among immigrants, this figure is 20.2%, and very similar before and during the crisis. Nonexit from unemployment might also be related to the underground economy. Nonetheless, our duration framework properly accounts for this issue in the formulation of the likelihood function, which is crucial to have consistent estimates of the parameters.

FIGURE 1
Empirical Unemployment Hazards, by Period



The analysis is also conditional on $b^k(t)$, a set of variables that captures whether the worker receives unemployment benefits and his benefit entitlement. For the employment hazard 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 the studies by Bover, Arellano, and Bentolila (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 the strict exogeneity of the benefit indicator and to the

FIGURE 2
Empirical Employment Hazards, by Period

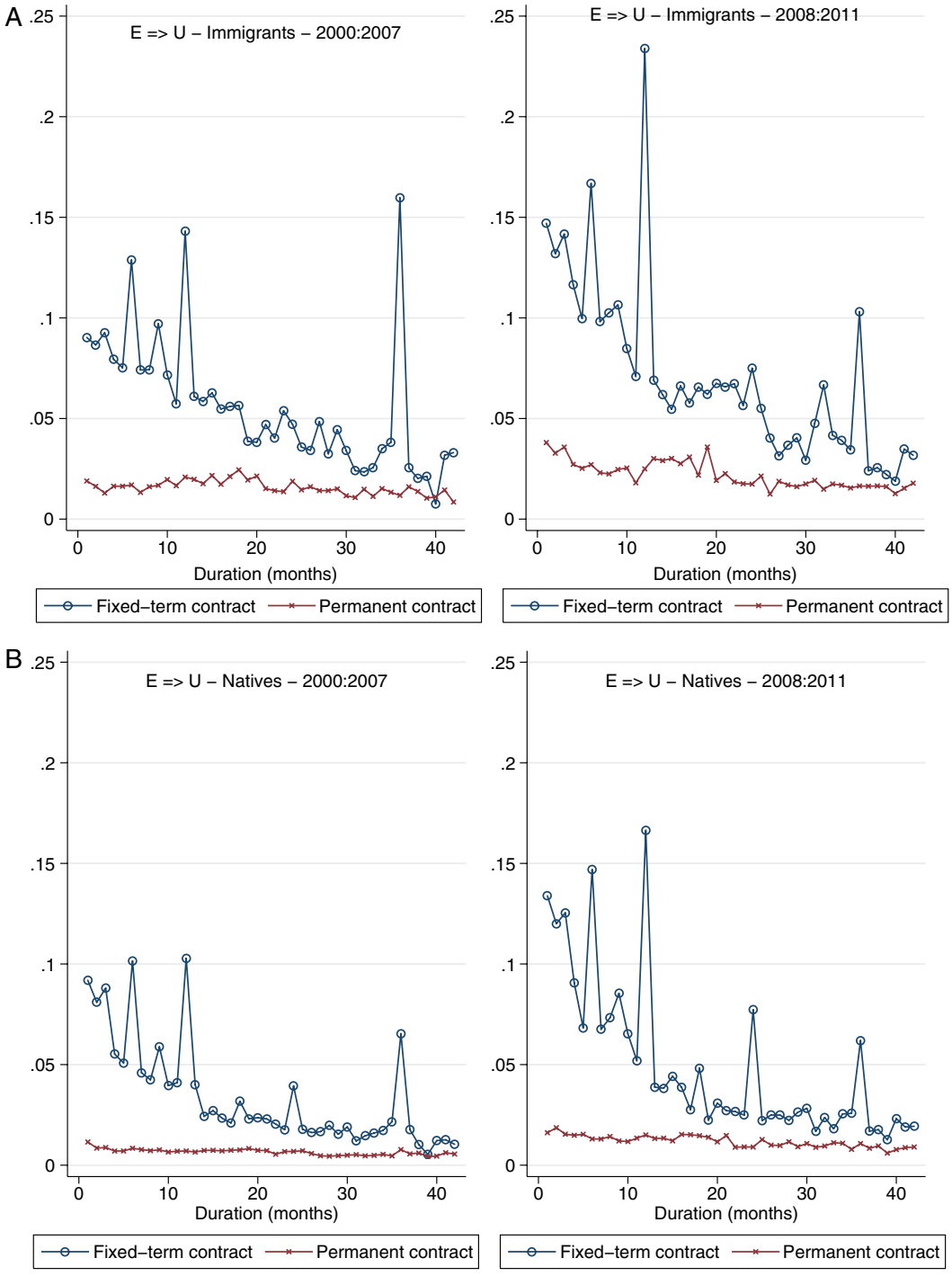
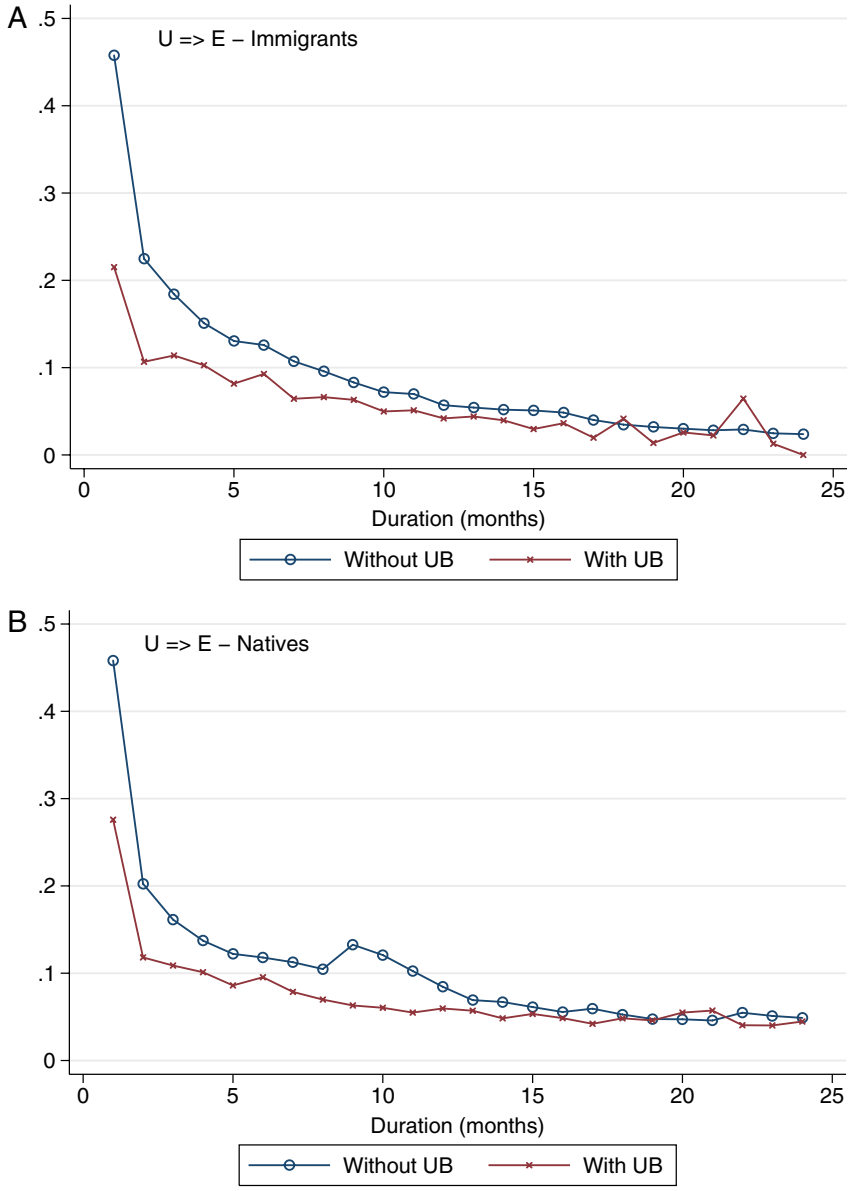


FIGURE 3
Empirical Unemployment Hazards and Unemployment Benefits Receipt



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 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 economic 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 the interaction effects between duration and the conditioning variables.

Finally, $F(\cdot)$ denotes the logistic cumulative distribution function, $F(z) = e^z/(1+e^z)$.

A. *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 first consider 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.

Let c_i denote an indicator of the lack of right censoring, and let y_{it}^k be a $(0,1)$ variable indicating whether an exit from the spell of unemployment or employment is observed in period t or not. Then, the log-likelihood function takes the form

(1)
$$\log L^k = \sum_{i=1}^{N^k} \sum_{t=1}^{\bar{t}^k} \left\{ \left(1 - c_i y_{it}^k\right) \log \left[1 - h_i^k(t)\right] + c_i y_{it}^k \log h_i^k(t) \right\}, k = u, e$$

where N^k is the number of unemployment or employment spells in the sample, and $\bar{t}^k$ is the largest observed duration.

The maximum likelihood estimates of the 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

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

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

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

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

B. *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.[22] 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 distribution $\mu(\eta)$ has been addressed extensively in the literature (see Van den Berg 2001). Heckman and Singer (1984) proposed controlling for unobserved heterogeneity without explicitly specifying a parametric distribution for it. 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.[23]

We follow Heckman and Singer (1984) and consider that η^u and η^e follow a bivariate discrete distribution where both η^u and η^e have two location points. Thus, the distribution of the unobserved heterogeneity is specified with four points of support $\left(s_1^u, s_1^e\right)$, $\left(s_1^u, s_2^e\right)$, $\left(s_2^u, s_1^e\right)$, and $\left(s_2^u, s_2^e\right)$ with the corresponding joint probabilities: $P_{11} = \Pr\left(\eta^u = s_1^u, \eta^e = s_1^e\right)$, $P_{12} = \Pr\left(\eta^u = s_1^u, \eta^e = s_2^e\right)$, $P_{21} = \Pr\left(\eta^u = s_2^u, \eta^e = s_1^e\right)$, and $P_{22} = \Pr\left(\eta^u = s_2^u, \eta^e = s_2^e\right)$.[24] 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

22. Kalwij (2010) also uses multiple spell data to study individuals' unemployment experiences.

23. The performance of estimators that approximate the distribution of unobserved heterogeneity by means of a discrete distribution is studied by Baker and Melino (2000), among others.

24. Belzil (2001) also uses a bivariate discrete distribution with two points of support using single-spell data.

exit rates from employment, and individuals with low exit rates from both states.[25]

Thus, the joint likelihood function is given by

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

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

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

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, the 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 Honoré 1993).

VI. ESTIMATION RESULTS

The model described in the previous section (Equation (3)) is estimated for natives and immigrants separately. The estimates of the effect of economic conditions and benefits are presented in Sections VI.A and VI.B, respectively. 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 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.

Before explaining our main results, we present the estimates regarding the distribution of the unobserved heterogeneity. As explained above, it is specified with four mass points. Table 4 shows that the probability of the type with high exit rates both from unemployment and employment is the lowest in our sample, especially among natives (7.7% and 10.5% for natives and immigrants, respectively). Moreover, the probability of having high unemployment and low employment exit rates is approximately 29%, for both natives and immigrants. The probability of the type with the "worst" characteristics (low unemployment and high employment hazard rates) is 31% for natives and almost 38% for immigrants. The rest of workers are classified, according to the estimated distribution of unobserved heterogeneity, as having low exit rates from both employment and unemployment. Thus, they are workers with a low risk of being dismissed and simultaneously with low chances of returning to employment if unemployed.

A. The Effect of Economic Conditions

Table 5 presents estimates of the effect of economic conditions on both the unemployment and employment hazards. This effect is captured by the yearly regional employment growth rate.[26]

As explained in Section II, search theory provides ambiguous predictions of the effect of economic conditions. Our results point to a positive effect of better economic conditions on the hazard of leaving unemployment. This positive effect decreases with duration (notice the negative coefficient on the interaction between the employment growth rate and log duration).[27] Therefore, during the boom, the short-term unemployed found it easier to exit from unemployment in comparison to the long-term unemployed. This can be interpreted as evidence in favor of the idea that when hiring, firms favor workers with low unemployment durations.

We find that the effect of economic conditions on the unemployment hazard is stronger for immigrants than it is for natives. Table 7 shows that the difference in the predicted unemployment 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 16 p.p. for immigrants. After 12 months

25. Notice that this distribution of the unobserved heterogeneity is more flexible than the one in Tatsiramos (2009) who assumes two mass points $\left(s_1^u s_1^e\right)$ and $\left(s_2^u s_2^e\right)$ with probabilities P_1 and P_2.

26. Alternatively, aggregate effects have been 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.

27. These results are in line with Bover et al. (2002).

TABLE 4
Heterogeneity Parameters

	Natives		Immigrants	
	Coeff.	**S.E.**	**Coeff.**	**S.E.**
Support points				
High exit from unemployment (s_1^u)	−0.673	0.040	−0.813	0.086
Low exit from unemployment (s_2^u)	−1.787	0.038	−1.895	0.085
High exit from employment (s_1^e)	−2.639	0.175	−1.532	0.247
Low exit from employment (s_2^e)	−3.682	0.175	−2.385	0.248
Probabilities				
Prob. of high exit from unem. and emp.	0.077	0.006	0.105	0.028
Prob. of high exit from unemp. and low from emp.	0.291	0.008	0.296	0.032
Prob. of low exit from unemp and high from emp.	0.312	0.011	0.377	0.042
Prob. of low exit from unemp and emp.	0.320		0.222	

Notes: 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 $P_{22} = \Pr(\eta^u = s_2^u, \eta^e = s_2^e)$, respectively.

TABLE 5
Effect of Economic Conditions on Unemployment and Employment Hazards

	Natives		Immigrants	
	Coeff.	**S.E.**	**Coeff.**	**S.E.**
Unemployment hazard				
Δ Empl. rate	0.067	0.002	0.102	0.002
Δ Empl. rate × log Dur	−0.009	0.001	−0.012	0.001
Employment hazard				
Permanent workers				
Δ Empl. rate	−0.037	0.008	−0.077	0.007
Δ Empl. rate × log Dur	0.003	0.003	0.018	0.003
Temporary workers				
Δ Empl. rate	−0.032	0.002	−0.055	0.003
Δ Empl. rate × log Dur	0.001	0.001	0.014	0.001

Notes: The unemployment and employment hazard functions are estimated jointly, allowing for correlated unobserved heterogeneity. Δ Empl. rate is the yearly regional employment growth rate.

in unemployment, the differences for immigrants and natives are 4.4 and 3 p.p., respectively.

As for the employment hazard, Table 5 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 the effect of favorable economic conditions is larger in absolute value for workers with a permanent contract than for those with a temporary one.

Similarly to the unemployment hazard, we find that the effect of economic conditions is stronger for immigrants, although again, it decreases more rapidly with employment duration. In terms of the predicted unemployment hazards, Table 8 shows that the difference in predicted hazards between the expansionary and the recession period at the beginning of the employment spell for a permanent worker is 0.52 p.p. for natives with benefits in the previous unemployment spell, but it is 3.81 p.p. for immigrants. After 12 months in employment, the differences for natives and immigrants are 0.30 and 1.41 p.p., respectively.

B. The Effect of Unemployment Benefits

The effect of unemployment benefits over the unemployment hazard rate is captured by an unemployment benefit receipt indicator and by a set of variables that capture the time before exhausting the benefits receipt (1–3, 4–6, and 7–12 months).[28]

Consistent with the previous literature, Table 6 indicates that the receipt of unemployment benefits reduces the hazard of leaving unemployment. This is in agreement with the theoretical predictions of the models outlined in Section II. We also find that the reduction in the hazard decreases as duration increases (note the positive coefficient on Receiving UB × log Dur).

The effect of benefits is stronger among immigrants, although it decreases with duration at a higher rate than it does for natives. According with the predicted hazards in Table 7, the difference between the hazard for an immigrant without and with benefits at the beginning of the unemployment spell is approximately 8 p.p. higher than for a comparable native during the expansion. As unemployment duration increases, this difference decreases. One possible interpretation of this finding is that for immigrants, unemployment benefits are the main source of income when they become unemployed, while it is more likely that natives also have other sources of income due to their family networks. Actually,

28. As previously indicated, it is crucial to condition on the benefit entitlement because it allows us to treat the benefit indicator variable as strictly exogenous.

TABLE 6
Effect of Unemployment Benefits on Unemployment and Employment Hazards

	Natives		Immigrants	
	Coeff.	**S.E.**	**Coeff.**	**S.E.**
Unemployment hazard				
UB	−1.209	0.024	−1.362	0.043
UB × log Dur	0.183	0.017	0.292	0.025
Δ Empl. rate × UB	−0.001	0.003	−0.056	0.004
Employment hazard				
Permanent workers				
UB × Entitl. 1–6 m.	0.020	0.072	0.284	0.076
(UB × Entitl. 1–6 m) × Em.dur. 6–12 m.	0.015	0.135	−0.047	0.133
UB × Entitl. 7–24 m.	0.406	0.050	0.695	0.078
(UB × Entitl. 7–24 m) × Em.dur. 6–12 m.	−0.095	0.087	−0.157	0.139
Temporary workers				
UB × Entitl. 1–6 m.	−0.099	0.023	0.029	0.025
(UB × Entitl. 1–6 m) × Em.dur. 6–12 m.	0.389	0.037	0.246	0.043
UB × Entitl. 7–24 m.	−0.069	0.021	0.147	0.029
(UB × Entitl. 7–24 m) × Em.dur. 6–12 m.	0.271	0.034	0.055	0.051

Notes: UB is a benefit receipt indicator, which refers to the previous unemployment spell for the employment hazard. For the employment hazard, the benefit receipt indicator is interacted with the entitlement period and with a dummy indicating the duration of the current employment spell.

according to Census data for 2011, 63.2% of male natives between 18 and 50 years old have an employed spouse, while this figure falls to 46.6% for immigrants.

We also analyze if the effect of unemployment benefits on unemployment duration changes with the economic conditions. Interestingly, we only find evidence of a differential effect of benefits depending on the economic conditions of immigrants (see the coefficient of the interaction in Table 6). Specifically, when economic conditions improve, the disincentive effect of benefits increases for this group of workers.

For the employment hazard, the effect of benefits is captured by an indicator of having received benefits in the previous unemployment spell. To capture a differential effect depending on the potentially available time to find a job, the benefits receipt indicator is interacted with the entitlement period (1–6 or 7–24 months). We also interact it with a dummy indicating whether the duration of the current employment spell is between 6 and 12 months. The motivation in this case is to capture potential increases in the hazard rate as workers requalify for unemployment benefits. We find that the effect of having received benefits during the previous unemployment spell has a negative impact on the subsequent employment hazard only for native temporary workers. This result is in line with Tatsiramos (2009), who, using a sample of European countries, finds that the beneficial effect is larger in countries with more generous unemployment insurance systems. Nonetheless, according to our results, this effect vanishes when the worker becomes re-eligible to receive unemployment benefits, which is consistent with Rebollo-Sanz (2012), who finds that when an employee again qualifies for unemployment benefits, there is a spike in the probability of leaving employment.

Our results also point to the importance of accounting for the current employment duration. Table 6 shows that the negative effect of previous unemployment benefits for temporary native workers disappears and becomes positive when the current employment duration is

TABLE 7
Predicted Unemployment Hazards for a Reference Individual

	Natives			Immigrants		
	Unempl. Dur. (months)			**Unempl. Dur. (months)**		
	1	**12**	**18**	**1**	**12**	**18**
Period 2000–2007						
Not receiving UB	46.73 (0.26)	13.26 (0.15)	9.67 (0.15)	52.56 (0.41)	13.09 (0.25)	7.72 (0.22)
Receiving UB	22.12 (0.40)	6.81 (0.19)	9.10 (0.32)	20.25 (0.72)	7.16 (0.33)	8.89 (0.52)
Period 2008–2011						
Not receiving UB	36.84 (0.31)	10.27 (0.13)	7.55 (0.13)	37.03 (0.39)	8.64 (0.15)	5.12 (0.13)
Receiving UB	15.68 (0.33)	5.07 (0.14)	6.95 (0.25)	15.88 (0.58)	4.09 (0.16)	4.91 (0.26)

Notes: The reference individual has the mean values of the sample variables for natives and immigrants and at the mean employment growth rates before 2008 (3.72%) and afterward (−2.90%). For individuals who receive unemployment benefits, the predicted hazard corresponds to and entitlement period of 18 months. St. errors (between brackets) calculated by simulation from the empirical distribution of the parameters.

TABLE 8
Predicted Employment Hazards for a Reference Individual.

	Natives			Immigrants		
	Empl. Dur. (months)			Empl. Dur. (months)		
	1	12	18	1	12	18
Period 2000–2007						
Permanent workers	1.00 (0.41)	0.62 (0.18)	0.64 (0.30)	3.26 (0.45)	2.60 (0.43)	3.00 (0.41)
Temporary workers	12.24 (1.04)	20.50 (1.63)	5.25 (0.49)	12.77 (1.61)	25.75 (2.86)	9.78 (1.30)
Period 2008–2011						
Permanent workers	1.52 (0.15)	0.90 (0.10)	0.93 (0.08)	6.07 (0.79)	3.69 (0.60)	4.05 (0.54)
Temporary workers	16.13 (1.30)	27.70 (1.90)	6.95 (0.64)	18.48 (2.15)	30.04 (3.11)	11.50 (1.49)

Notes: The predicted hazards are evaluated for an individual who received unemployment benefits when unemployed with an entitlement period of 18 months and with the mean values of the sample variables. The mean employment growth rate was 3.72% before 2008 and −2.90% afterward. St. errors (between brackets) calculated by simulation from the empirical distribution of the parameters.

between 6 and 12 months. That is, when the worker becomes re-eligible for unemployment benefits, there is a spike in the probability of leaving employment. The predicted hazards reported in Table 8 give the magnitude of these effects. For instance, a temporary native who spent 12 months in employment and who received unemployment benefits exhibits a hazard in employment almost 3 p.p. higher than a nonrecipient, while after 18 months in employment, this figure is approximately 0.34 p.p. lower.

C. Robustness Checks

The previous model specifies the determinants of a single risk: that of leaving employment or unemployment to enter into unemployment or into employment. To account for the dual nature of the Spanish labor market, we have allowed for a differential effect of the observable variables depending on the contract type, whether permanent or temporary. Nonetheless, it could be interesting to consider a situation where there are competing risks, specifically, that a spell of unemployment can end in either permanent or temporary employment.

To that end, we have estimated a competing-risk model for the unemployment hazard jointly with a single risk model for the employment hazard. We have tried to estimate the model accounting for unobserved heterogeneity with 8 location points. That is, considering that the unobserved heterogeneity in the employment hazard is captured by the random variable η^e, while for the unemployment hazard, it is captured by the variables η^{ut} and η^{up}, for the temporary and permanent risks, respectively. Nonetheless, we have identification problems probably due to the fact that the hazard from unemployment to permanent employment is very small (1.2% on average during the first 2 years in unemployment for natives and 0.95% for immigrants) and, therefore, we cannot identify a model that includes different unobservables for each exit.

Given this, we have estimated the single-risk model for the employment hazard jointly with the competing-risk model for the unemployment hazard, allowing for unobserved heterogeneity with two location points in the employment hazard and another two in the unemployment to temporary employment hazard. Thus, in terms of the unobservables, we consider four types of individuals: those with high exit rates both from unemployment to temporary employment and from employment to unemployment, those with high exit rates from unemployment to temporary employment and low exit rates from employment, those with low exit rates from unemployment to temporary employment and high exit rates from employment, and those with low exit rates from both states. Note that although there are no specific location points in the exit from unemployment to permanent employment, this hazard rate is also dependent on the unobserved heterogeneity because the competing risk structure in the exit from unemployment is modeled through a multinomial logit specification.

The results are presented in Table 9. We do not report the estimated coefficients from the employment hazard because they basically coincide with those from Tables 5 and 6. Our results indicate that most of the effects found in the single risk model are due to the exit from unemployment to temporary employment,

TABLE 9
Competing Risks Model

Unemployment Hazard	Natives		Immigrants	
	Coeff.	S.E.	Coeff.	S.E.
Exit to temporary empl.				
UB	−1.187	0.026	−1.295	0.046
UB × log Dur	0.181	0.018	0.320	0.026
Δ Empl. rate	0.064	0.002	0.102	0.002
Δ Empl. rate × log Dur	−0.006	0.001	−0.009	0.002
Δ Empl. rate × UB	−0.003	0.004	−0.057	0.005
Exit to permanent empl.				
Receiving UB	−0.805	0.053	−1.186	0.110
Receving UB × log Dur	0.334	0.041	0.396	0.068
Δ Empl. rate	0.078	0.005	−0.005	0.008
Δ Empl. rate × log Dur	−0.008	0.003	0.082	0.005
Δ Empl. rate × Receiving UB	0.012	0.009	4.7E-6	0.004

Note: Joint estimates of the single risk model for employment and the competing risks model for unemployment, allowing for correlated unobserved heterogeneity.

TABLE 10
Selection Effect

	Natives		Immigrants	
	Coeff.	S.E.	Coeff.	S.E.
Unemployment hazard				
Δ Empl. rate	0.067	0.002	0.088	0.004
Δ Empl. rate × log Dur	−0.009	0.001	0.0003	0.003
Δ Empl. rate × UB	−0.001	0.003	−0.048	0.008

Note: Estimates using a subsample of immigrants in Spain before 2001.

given that the estimated coefficients are similar to those obtained in the competing-risk model when the destination is temporary employment. For instance, the effect of unemployment benefits for natives is larger on the exit from unemployment to temporary employment than on the exit to permanent employment. The other main difference is in the effect of the business cycle for immigrants. The previous result of larger disincentive effect of unemployment benefits under good economic conditions is also found here but only among those immigrants exiting to a temporary contract. If the exit is to a permanent contract, the effect of business cycle conditions is nonsignificant for this group of workers. The results for natives are similar to those of the single risk model.

VII. DISCUSSION OF THE RESULTS

Our previous estimates point to differences in employment and unemployment dynamics between immigrants and natives. In this section, we discuss several possible explanations for our findings.

A. *Selection Effect*

One potential explanation for the stronger effect of the economic conditions for immigrants may be the selective in- or out-migration of workers over the business cycle. For example, if outflows of immigrants from the host country are large during a period of crisis, we could expect that those immigrants that remain might be negatively selected. It could be also the case that the entrance of immigrants is larger during expansions and incoming immigrants are likely to already come with a job offer, giving rise to a positive selection in this case.

To obtain evidence in favor or against this hypothesis, we analyze how immigrants who have been in Spain in some base period are affected by economic conditions. We thus reestimate the models and restrict the immigrant sample to those who started working in Spain before 2001. Although the sample size is considerably smaller (7.1% of the total sample of immigrants) and the parameters are less precisely estimated, the results show a similar pattern to those reported in Table 5. Specifically, we find that immigrants' unemployment hazard still reacts more strongly than the native counterpart to the economic conditions, although in this case the differences between them are smaller (see Table 10). Thus, it is possible that some of the differences are due to selective migration, but as they still persist with this restricted sample of immigrants, it appears that the cyclical response is not driven completely by the potential problem of sample selection.

B. *Spatial Distribution*

Some studies (such as Jaeger 2007) show that immigrants respond to labor market conditions when choosing where to live. In particular, immigrants could self-select into regions that offer the best economic conditions (i.e., the highest wages or lowest unemployment rates). In our benchmark estimates, we take into account the potential effect of differences in the spatial distribution of immigrants and natives since the variable that captures the business cycle effect has regional variation. Nonetheless, to better isolate the previous effect, we perform estimates

TABLE 11
Spatial Distribution

	Natives		Immigrants	
	Coef.	**S.E.**	**Coef.**	**S.E.**
Unemployment hazard				
Δ Empl. rate	0.071	0005	0.090	0.004
Δ Empl. rate × log Dur	−0.011	0.003	−0.005	0.003
Δ Empl. rate × UB	−0.012	0.009	−0.056	0.009
Employment hazard				
Permanent workers				
Δ Empl. rate	−0.049	0.017	−0.040	0.013
Δ Empl. rate × log Dur	0.005	0.006	0.018	0.005
Temporary workers				
Δ Empl. rate	−0.037	0.006	−0.06	0.004
Δ Empl. rate × log Dur	0.002	0.004	0.017	0.003

Note: Estimates using a subsample of immigrants and natives living in Catalonia.

that compare immigrants and natives in the region with the highest proportion of immigrants in our sample, Catalonia (24.3% of our sample of immigrants).[29] As Table 11 shows, we still find a stronger effect of economic conditions for immigrants than for natives, although in comparison with the benchmark estimates, the differences between the two groups of workers are reduced. According to these results, it does not appear that differences in the spatial distribution are the main reason for the differences found.

C. Sectorial Distribution

Another potential explanation for our results is that immigrants are more concentrated in sectors of the economy that are more affected by the economic conditions, such as the construction sector. In our benchmark estimates we already take into account the effect of the sector of activity by adding sectorial dummies and their interaction with the business cycle. Table B1 shows that for workers in construction, the negative effect of favorable economic conditions in the employment hazard is the largest, for both immigrants and natives. In order to better isolate this effect, we re-estimate the models using the subsample of workers that had been in the construction sector during a large share of their careers. Specifically, we restrict the sample to those workers in the construction sector for more than 75% of their working lives and compare the results with those obtained using the subsample of workers in the rest of the sectors.

The results are shown in Table 12. In accordance with the estimates in Table B1, we find that the effect of the economic conditions is stronger for the workers in the construction sector for both immigrants and natives. Therefore, it does not appear that immigrant workers in the construction sector versus immigrants in other sectors are affected by the economic conditions very differently than native workers are.[30] Within sectors, we still find that the effect of the cycle is stronger for immigrants than for natives both in the construction and in the rest of the sectors.[31]

D. Search Frictions

As Dustman et al. (2010) point out, another possible explanation for the different cyclical responses of unemployment for natives and immigrants could rely on the existence of search frictions. Specifically, this potential explanation refers to equilibrium search models and it has to do with the idea that unemployment is due to search frictions and that the hiring of workers by firms depends on the profitability of opening vacancies. If the separation rate of a group of workers is low, then the current productivity of the worker becomes less important for the firm, which will focus more on the average productivity. Thus, the higher the separation rate, the more closely firms follow the business cycle, and the more pro-cyclical their offer of vacancies.

Our estimates of the predicted employment hazards (see Table 8) support this hypothesis, as we find that the employment hazard rates are larger for immigrants in all of the groups considered. Thus, it appears that the differences in job separation rates could partly explain the different responses of the unemployment hazard for immigrants and natives. Of course, another

29. This figure is in accordance with Amuedo-Dorantes and De la Rica (2010), who, using data from the Labor Force Survey also show that immigrants tend to reside in regions with higher employment rates.

30. This result is in line with Prean and Mayr (2012), who do not find evidence that a greater variability in the employment of immigrants is due to a selection of immigrants into specific industries.

31. In order to see if our results are affected by the fact that the informal economy is more frequent for low-qualified workers and if the proportion of immigrants is larger among these, we have re-estimated our models for the subsample of low-qualified immigrants and natives, and the differences among them still persist even after controlling for time-invariant unobserved heterogeneity (as we do in all of our estimates).

TABLE 12
Sectorial Distribution

	Only Construction				Rest of Sectors			
	Natives		Immigrants		Natives		Immigrants	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Unemployment hazard								
Δ Empl. rate	0.116	0.005	0.128	0.004	0.057	0.002	0.091	0.003
Δ Empl. rate × log Dur	−0.022	0.003	−0.014	0.003	−0.005	0.001	−0.006	0.002
Δ Empl. rate × UB	−0.032	0.007	−0.072	0.007	0.004	0.004	−0.049	0.006
Employment hazard								
Permanent workers								
Δ Empl. rate	−0.124	0.026	−0.164	0.014	−0.044	0.008	−0.076	0.008
Δ Empl. rate × log Dur	−0.001	0.009	0.025	0.006	0.002	0.003	0.014	0.003
Temporary workers								
Δ Empl. rate	−0.098	0.004	−0.104	0.004	−0.039	0.002	−0.062	0.003
Δ Empl. rate × log Dur	−0.002	0.002	0.016	0.002	0.003	0.001	0.013	0.002

Note: Estimates using a subsample of immigrants and natives in the construction and in the rest of the sectors separately.

question is why the job separation rates are larger for immigrants than for natives. Potential reasons could be that by definition, immigrants are more mobile geographically[32] and that some of them can return to their home countries. Actually, according to OECD data depending on the country of destination and the period of time considered, 20%–50% of immigrants leave within 5 years after their arrival to the host country. Specifically, for several selected Latin American countries, the share of returning immigrants from Spain is one of the highest (see OECD 2008).

E. Skill Differences

Another potential explanation for the differences found is based on the skill differences between natives and immigrants. Dustman et al. (2010) argue that the higher the substitutability between different types of labor and capital, the higher the adjustments in employment. Given that capital stocks are difficult to adjust, during recessions and expansions, firms will tend to adjust more the demand for the factors that are closest substitutes for capital.

We could test the previous hypothesis by using information on the "task" content of the workers' occupations. Unfortunately, the MCVL does not offer this type of information. Therefore, to investigate this possibility, we use data from the Structure of Earnings Survey for 2006, which offers detailed information on the occupation at a highly disaggregated level according to the National Classification of Occupations. We estimate a set of probability models and find that conditional on education and tenure, male immigrants have a 15-p.p. higher probability of performing manual tasks and a 12-p.p. lower probability of being professionals and technicians than native workers.[33] These results are in accordance with the lower complementarity to the capital of immigrants versus natives.

VIII. CONCLUSIONS

Our main empirical results can be summarized as follows: (1) Better economic conditions lead to a higher exit rate from unemployment and a lower exit rate from employment, with this effect being stronger for immigrants than for natives; (2) The previous effect decreases with duration at a higher rate among immigrants; (3) Unemployment benefits lower the unemployment hazard rate, and this effect is larger for immigrants than for natives but only at the beginning of the spell; (4) The disincentive effect of benefits is stronger for immigrants when economic conditions improve; and (5) Unemployment benefits increase job match quality, but this effect is only significant for native workers with temporary contracts and it vanishes when the worker becomes re-eligible to receive unemployment benefits.

32. According to residential variations data, in 2007, the mobility of immigrants between municipalities in Spain was four times higher than that of natives (see Pajares 2009).

33. These estimates are available upon request.

We discuss several potential explanations for these findings. First, we offer evidence that our results on the effect of economic conditions are not mainly driven by selective migration. Moreover, we show that the concentration of immigrants in heavily cyclical sectors or regions does not make them particularly more sensitive to economic conditions. We provide evidence that higher job separation rates and the lower capital-labor complementarity of immigrants are possible mechanisms compatible with our results. Finally, differences in the disincentive effect of benefits for immigrants and natives can be related to differences in additional sources of income provided by family networks between these two groups of workers.

Our analysis of the effect of unemployment benefits could be useful from a policy perspective. There exists a growing body of literature about the optimal design of unemployment insurance over the business cycle. Whereas some papers (e.g., Schmieder, Wachter, and Bender 2012 or Landais, Michaillat, and Saez 2013) are in favor of a system with countercyclical unemployment benefits, some others, such as Mitmany and Rabinovichz (2011), support a more pro-cyclical pattern. In a similar line, Wang and Williamson (1996) find that the optimal way to provide incentives to the worker in a context of employment risk is a mix of nonmonotonic replacement rates and a tax on re-employment wages depending on unemployment duration. This latter could alleviate the important disincentive effect we find at the beginning of the unemployment spell for both immigrants and natives.

Nonetheless, we do not find evidence that the disincentive effect of unemployment benefits is larger under bad economic conditions (actually, for immigrants, it is smaller). Therefore, it does not appear that workers are less able to self-insure during downturns, so there is no change in the marginal utility of consumption during bad times, which is one of the two conditions that Schmieder et al. (2012) require for the optimal unemployment insurance to be countercyclical. Actually, our results suggest that for immigrants, unemployment benefits should be pro-cyclical, but the possibility of offering them larger and longer unemployment benefits during bad times might have negative externalities for all workers because it would raise employees' outside options in wage bargaining, thereby discouraging firms from posting new vacancies for them.

APPENDIX A: SAMPLE SELECTION AND VARIABLES DEFINITION

TABLE A1
Sample Selection

	Natives	**Immigrants**
No. individuals (initial sample)	595,454	67,675
No. individuals dropped due to		
entering into unemployment before 1997	109,929	273
Age below 18 or above 49	93,343	3,452
Age of the first job over 30 (natives) or 35 (immigrants)	19,800	15,372
Working in agriculture or self-employment	291	214
Missing occupation	733	39
Duration of unemployment/employment below 15/30 days	47,344	2,289
No. individuals (final sample)	324,014	46,036
No. individuals (estimation sample)	32,586	23,016

TABLE A2
Variables Definition

Variable Name	**Definition**
UB[a]	The worker receives unemp. benefits
Time to exhausting UB[a]	No. months until UB are exhausted
UB entitlement[a]	No. months the worker is entitled to receive UB
Δ Empl. rate	Annual and regional growth rate of employment
Sector of activity[b]	Industry, construction, nonmarket services, market services
Age	18–30, 31–44, 45–49
Job qualification[b]	High, intermediate, low
Fired	Nonvoluntary exit from the previous job
Big firm[b]	Firm with more than 250 workers
New firm[b]	Created 12 or less months before the worker was hired
Private firm[b]	Firm is not public
Temporary H. Agency[b]	Coming from a Temporary Help Agency
Type of contract[b]	Permanent or temporary
Part-time[b]	Part-time employment
Total empl.	No. months of previous employment
Country of origin	Latin-America, Asia, USA, and Canada, 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)

[a]Current spell for the unemployed and to the previous spell for the employed.

[b]Current spell for the employed and to the previous spell for the unemployed.

APPENDIX B: ADDITIONAL ESTIMATION RESULTS

TABLE B1
Joint Estimates of Logistic Hazards for Leaving Unemployment and Employment Leaving Unemployment

Variable	Natives		Immigrants[a]	
	Coeff.	S.E.	Coeff.	S.E.
Duration				
log Dur	−2.194	0.030	−1.859	0.037
(log Dur)^2	1.184	0.027	0.966	0.035
(log Dur)^3	−0.231	0.006	−0.221	0.009
Individual characteristics				
Age 31–44	−0.148	0.018	−0.078	0.017
Age 45–49	−0.585	0.034	−0.303	0.094
Age 31–44 × log Dur	−0.078	0.009	0.021	0.011
Age 45–49 × log Dur	−0.097	0.017	0.150	0.056
High qualification	0.050	0.019	−0.116	0.035
Interm. qualification	0.120	0.014	0.073	0.016
High qualif. × log Dur	−0.001	0.012	0.034	0.024
Interm. qualif. × log Dur	−0.012	0.009	−0.015	0.012
Total empl.	0.038	0.001	−0.036	0.003
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
Contract and firm charact.[b]				
Big firm	0.100	0.014	−0.048	0.025
New firm	−0.026	0.011	−0.020	0.012
Private firm	0.445	0.031	0.786	0.080
Permanent contract	−0.340	0.015	−0.188	0.017
Part-time employment	−0.229	0.012	−0.245	0.017
Fired	0.150	0.012	0,031	0,013
Temporary H. Agency	0.255	0.015	0,433	0,023
Sector[b] *and quarterly dummies*				
Industry	0.050	0.014	−0.008	0.021
Construction	0.149	0.012	0.114	0.014
Nonmarket services	0.025	0.025	−0.260	0.058
First quarter	0.251	0.011	0.375	0.014
Second quarter	0.481	0.011	0.360	0.014
Third quarter	0.270	0.011	0.251	0.013

[a]The hazard function includes dummies for region of origin and regularization year.
[b]In the previous employment spell.

TABLE B2
Joint Estimates of Logistic Hazards for Leaving Unemployment and Employment Leaving Employment

Variable	Permanent Empl.				Temporary Empl.			
	Natives		Immigrants[a]		Natives		Immigrants[a]	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Duration								
log Dur	−0.152	0.023	−0.021	0.021	−0.316	0.009	−0.142	0.010
Dur. empl. 6 months					0.734	0.018	0.584	0.020
Dur. empl. 12 months					1.178	0.026	1.093	0.031
Dur. empl. 36 months					1.030	0.084	1.038	0.130
Dur. previous unem. spell 1–6 m.	0.257	0.040	−0.065	0.053	−0.125	0.015	−0.120	0.022
Individual characteristics								
Age 31–44	1.019	0.071	0.371	0.062	0.404	0.022	0.188	0.019
Age 45–49	3.222	0.126	2.673	0.510	1.145	0.043	0.905	0.117
Age 31–44 × log Dur	−0.047	0.025	−0.029	0.025	0.004	0.011	−0.018	0,012
Age 45–49 × log Dur	−0.138	0.045	−0.185	0.182	0.054	0.021	−0.095	0,066
High qualification	−0.439	0.079	0.141	0.097	−0.443	0.027	−0,188	0.045
Interm. qualification	−0.254	0.076	0.313	0.066	−0.102	0.019	−0.050	0.020
High qualif. × log Dur	−0.031	0.030	−0.078	0,039	−0.056	0.015	−0.0223	0.028
Interm. qualif. × log Dur	0.065	0.029	−0.082	0.026	−0.007	0.011	0.014	0.013
Total empl.	−0.159	0.003	−0.386	0.008	−0.074	0.001	−0.097	0.003

TABLE B2
Continued

Variable	Permanent Empl.				Temporary Empl.			
	Natives		Immigrants[a]		Natives		Immigrants[a]	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Contract and firm charact.								
Big firm	−0.497	0.046	−0.370	0.065	−0.177	0.019	−0.197	0.030
New firm	0.235	0.027	0.322	0.028	0.061	0.013	0.134	0.013
Private firm	−0.013	0.159	−0.545	0.237	0.094	0.039	−0.033	0.082
Part-time employment	0.396	0.037	0.155	0.035	0.215	0.016	0.129	0.019
Temporary H. Agency	−0.413	0.112	0.575	0.156	0.014	0.022	−0.048	0.030
Sector and quarterly dummies								
Industry	−0.221	0.035	−0.087	0.042	−0.089	0.020	−0.101	0.022
Construction	0.248	0.037	0.413	0.033	0.035	0.015	0.068	0.015
Nonmarket services	−0.371	0.084	−0.207	0.132	−0.131	0.033	−0.201	0.063
Δ Empl. rate × industry	−0.044	0.008	−0.061	0.020	−0.021	0.004	−0.030	0.011
Δ Empl. rate × construction	−0.081	0.008	−0.079	0.015	−0.061	0.003	−0.038	0.006
Δ Empl. rate × nonmarket serv.	0.006	0.017	0.004	0.052	0.008	0.004	0.064	0.022
First quarter	−0.012	0.033	−0.160	0.034	−0.318	0.014	−0.3701	0.016
Second quarter	−0.040	0.033	−0.141	0.034	−0.142	0.014	−0.186	0.015
Third quarter	−0.014	0.033	−0.142	0.033	0.130	0.013	−0.104	0.014
No. obs.	2,195,099		1,159,365					
Joint log-likelihood	−429,779.98		−307,867.59					

[a]The hazard function includes dummies for region of origin and regularization year.

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