

# **THE INS AND OUTS OF UNEMPLOYMENT AND THE ASSIMILATION OF RECENT IMMIGRANTS IN SPAIN<sup>(1)</sup>**

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## **ABSTRACT**

In this paper we study the assimilation (in employment terms) of the recent wave of immigration in Spain for the period 2002-2006. Besides the picture of heterogeneity that emerges from the origins of the workers, we differentiate the immigrants by their year of arrival in Spain (old and new immigrants). Following Shimer (2005) and using data from the Spanish Labor Force Survey we calculate the job finding and the job separation rates. Over all the period, immigrants show higher job finding and job exit rates. We also present a search and matching model with search intensity, where native people, new immigrants and old immigrants compete in the labor market. The simulated model is able to reproduce the differences observed in their job finding rates.

**Keywords:** job finding rate, job exit rate, immigrant assimilation, search and matching Models.

**JEL Classifications:** E24, J61, J64.



## I. INTRODUCTION

Until the end of the eighties Spain was a country of emigration, but during the last decade the immigration flows to the Spanish economy have changed drastically. In Spain, the working-age population was expected to increase by half a million from 1995 to 2005; because of immigration, it increased by 2.8 million (OECD, 2007). The foreign-born population in Spain has increased from 0.64 million in 1998 (1.6% of total population) to 4.48 million in 2007 (9.9% of the total population). This implies an average net flow of five hundred thousand foreign people a year.

This change in migration patterns was the motivation for us to study the immigrants' behavior in the Spanish labor market. In particular, we analyze the labor market assimilation of immigrants recently documented by Amuedo-Dorantes and de la Rica (2007) and Fernandez and Ortega (2008)<sup>1</sup>.

In greater detail, using Spanish data from the 2001 Population Census (*Censo de Población*) and the 2002 Earnings Structure Survey (*Encuesta Estructura Salarial*) Amuedo-Dorantes and de la Rica (2007) find evidence of immigrant employment assimilation over the first 5 years of residence. During this period, immigrants improve their probability of employment by an average of 10 percentage points. Similarly, and using data from the Spanish Labor Force Survey (*Encuesta de Población Activa*)<sup>2</sup> from 1996 to 2006, Fernandez and Ortega (2008) show that 5 years after their arrival the immigrants' probability of being unemployed is similar to or even lower than that of native people.

In contrast to the estimated employment and unemployment probabilities used by these authors, we analyze the assimilation of immigrants using the flows approach developed by Shimer (2005). In particular, using data from the Spanish Labor Force Survey for the period 2002-2006, we calculate the job finding rate and the separation rate and provide evidence about the differing success of immigrants and native people in the Spanish labor market. To explain the observed differences in their job finding rates, we present a search and matching model with native workers and two types of immigrants: (i) new immigrants, who are these workers with a higher separation rate, fewer country-specific skills, higher job search costs, a lower unemployment coverage rate and partial return migration rate to their countries of origin; and (ii) old or incumbent

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<sup>1</sup> Chiswick (1978) found the earning gap between the native people and immigrants decreases, or even disappears, as immigrants residence in U.S. lengthens. Borjas (1985) questioned these results using census data. He concludes that, while immigrant earnings growth rates are higher than those for native people, they are lower than those found in the cross-sectional analysis.

<sup>2</sup> The Spanish Labor Force Survey is a quarter household survey that interviews 65.000 households each period (about 180.000 individuals). Each household remains into the sample for six periods, and a sixth is renewed each quarter.



immigrants, with the same skills level, job search costs and unemployment coverage rates than native workers but, like new immigrants, with a positive return migration rate and, therefore, higher job separation rate. We simulate the model by reproducing the relative increment of immigrants compared native people observed in the Spanish labor force.

The benchmark model reproduces the differences in the job finding rates between immigrants and native people. In greater detail, the job finding rate of a new immigrant is higher than the rate for native people. This result occurs because the former group of workers shows a relatively low coverage rate, so they look for jobs more intensively and they have fewer requirements accepting jobs. By contrast, the job finding rate of old immigrants is the same as that for native people because they have similar coverage rate. With respect to the other parameters related to the assimilation of immigrants, the job finding rate of new immigrants shows only marginal sensitivity with respect to their differences in the country-specific skills, job search costs, separation and return migration rates.

The remainder of the paper is structured as follows: in section two we describe the data and present some Spanish labor market facts. Section three presents the model. Section four contains the calibration strategy. Sections five and six show the simulated results and the sensitivity analysis to the main immigration parameters, respectively. Finally, section seven is the conclusion.

## **2. SPANISH LABOR MARKET FACTS**

### **2.1. Descriptive Statistics**

In this section we present a set of indicators that summarize the operation of the Spanish labor market, from 2002 until 2006. The period of analysis was chosen based on the fact that since 2002 we have been able to capture the effects of the immigration process that started during the second half of the nineties<sup>3</sup>.

Table 2.1 displays some characteristics of the working age population. Young native people are more highly educated than immigrants. However, immigrant people older than 34 are more highly educated than the same cohort of native people. On average, there are more native people with primary education only. The gender composition is similar in both groups, with a higher proportion of women. The immigrant working age population is also, on average, five years younger than native people.

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<sup>3</sup> In this paper we define the immigrant population as people born outside European Union 15 (EU15).



**Table 2.1**  
**DESCRIPTIVE STATISTICS. AVERAGE 2002-2006**

Native People				Immigrants		
Level of education by age						
	Primary	Secondary	University	Primary	Secondary	University
Average	62.59	16.97	20.44	47.93	30.53	21.55
16-34	43.81	26.60	29.58	49.25	33.02	17.73
35-54	56.89	18.96	24.16	44.53	29.19	26.28
+ 54	86.26	5.77	7.97	56.09	19.69	24.22
Composition by Gender						
	Women	Men		Women	Men	
Percentage	51.17	48.83		50.81	49.19	
Average age of the working age population (16-64)						
	Women	Men		Women	Men	Women
Years	39.63	39.52		34.57	34.76	
Labor Market						
	Act.rate	Unemp. rate		Act.rate	Unemp. rate	
Percentage	54.65	9.97		76.73	13.63	
	Temporary			Temporary		
Percentage	29.75			58.15		

Source: Own elaboration from Spanish statistical office (INE) data.

The temporary employment rate for immigrants practically double the same rate for native people. 58.15 percent of immigrants have a temporary contract, while, among native people this proportion is 29.75 percent. The novelty of the immigration process in Spain is confirmed by the low average number of years of residence (3.25).

The unemployment rate is lower for native people than for immigrants over the whole period (9.97 and 13.63 percent, respectively). In addition, the unemployment rate declined significantly over these years for both groups. Specifically, for native people the rate fell from 11.25 percent in 2002 to 8.01 percent in 2006 and for immigrants the decline was from 15.01 percent to 11.88 percent in the same period. Meanwhile, the activity rate of immigrants is 22.1 percentage points higher than the rate for native people (76.73 and 54.65 percent respectively).

Regarding the assimilation process, in terms of unemployment rate, table 2.2 shows that the immigrant unemployment rate tends converge to the native unemployment rate the longer the time they spend in Spain. In the second row

of table 2.2 we can observe that, after five years of residence, the gap between immigrant and native unemployment rates is reduced by 1.75 percentage points.

**Table 2.2**  
**UNEMPLOYMENT RATE BI YEARS SINCE IMMIGRATION. AVERAGE YEAR**

Unemployment Rate					
Years since immigration	Zero	One	Two	Three	Four
Average (percentage)	25.51	16.81	13.51	10.83	10.87
	All immigrants	New immigrants	Old immigrants		
Average (percentage)	13.63	14.53	12.78		

Source: Own elaboration from INE data.

## 2.2. Ins and Outs of Unemployment

Following Shimer (2005), we consider a two-state model (employed or unemployed) for workers in order to calculate the job finding rate and the job exit rate for native people and immigrants. We use quarterly data from the Spanish Labor Force Survey to construct these rates<sup>4</sup>.

The period considered is from the first quarter of 2002 to the fourth quarter of 2006. We calculate total unemployment and unemployment for less than three months (as a proxy for short-term unemployment).

In particular, we assume that:

- $f_t$  is the rate at which all unemployed workers find a job in quarter  $t$ .
- All unemployed workers remain in the active population.

Then:

$$u_{t+1} = (1 - f_t)u_t + u_{t+1}^s, \quad (1)$$

where  $u_t^s$  is the number of workers unemployed for less than three months in quarter  $t$  and  $u_t$  is the total number of workers unemployed in quarter  $t$ .

Equation (1) shows that the number of unemployed workers in the quarter  $t+1$  is the sum of the number of unemployed workers in quarter  $t$  who fail to find a job plus the number of newly unemployed workers in  $t+1$  ( $u_{t+1}^s$ ). Thus, the job finding rate becomes

$$f_t = 1 - \frac{u_{t+1} - u_{t+1}^s}{u_t}. \quad (2)$$

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<sup>4</sup> Although gross worker flow data can be used to measure the job finding and separation rates directly, we can not use them because Spanish Labor Market Survey flow data base does not give information about nationality or country of origin.

In order to calculate the job exit rate  $s_t$  we use the following data:

- Employment,  $e_t$ .
- Next period short-term unemployment,  $u_{t+1}^s$ .
- Job finding rate,  $f_t$ .

Considering that when a worker loses his job, he has, on average, half the period to find a new job before he is recorded as unemployed, then the short-term unemployment rate during next quarter is approximately equal to

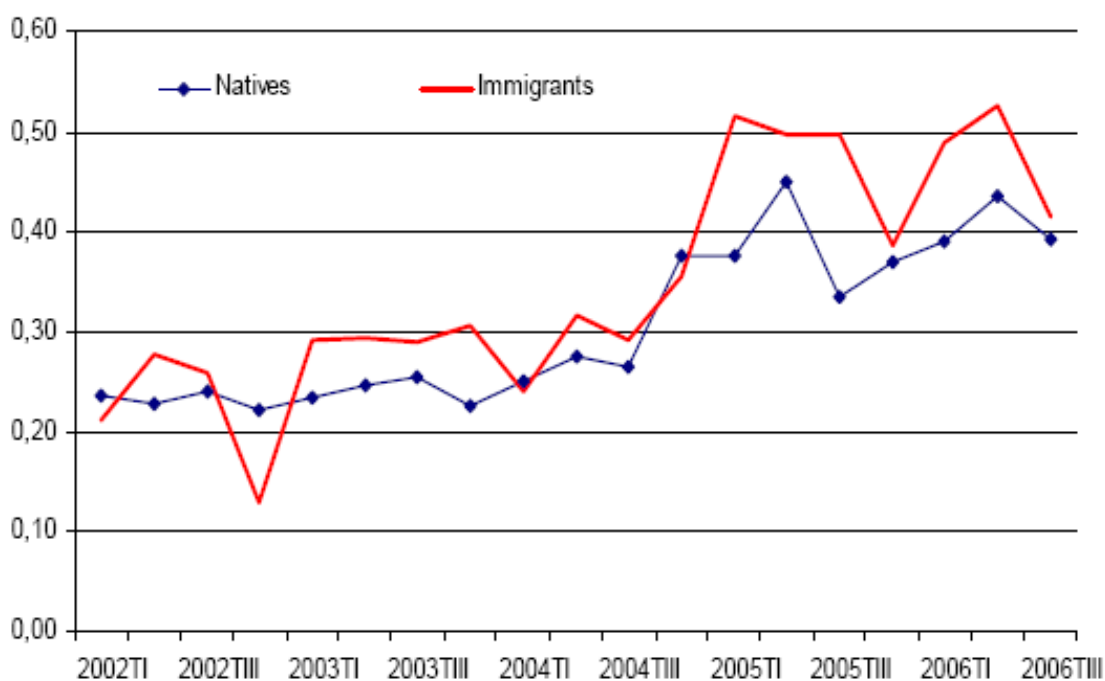
$$u_{t+1}^s = s_t e_t \left(1 - \frac{1}{2} f_t\right). \quad (3)$$

Expression (3) makes it possible to reduce the time-aggregation bias, which is particularly important during expansions, when the job finding rate is high. Then, the job exit rate can be measured as,

$$s_t = \frac{u_{t+1}^s}{e_t \left(1 - \frac{1}{2} f_t\right)}. \quad (4)$$

As can be observed in figure 2.1, the job finding rate for immigrants is higher than that for native people. The average rates are 0.306 for native people and 0.347 for immigrants. These rates increase for both collectives during the period. Finally, the variability is greater for immigrants than native people, with standard deviation of 0.115 and 0.079 respectively.

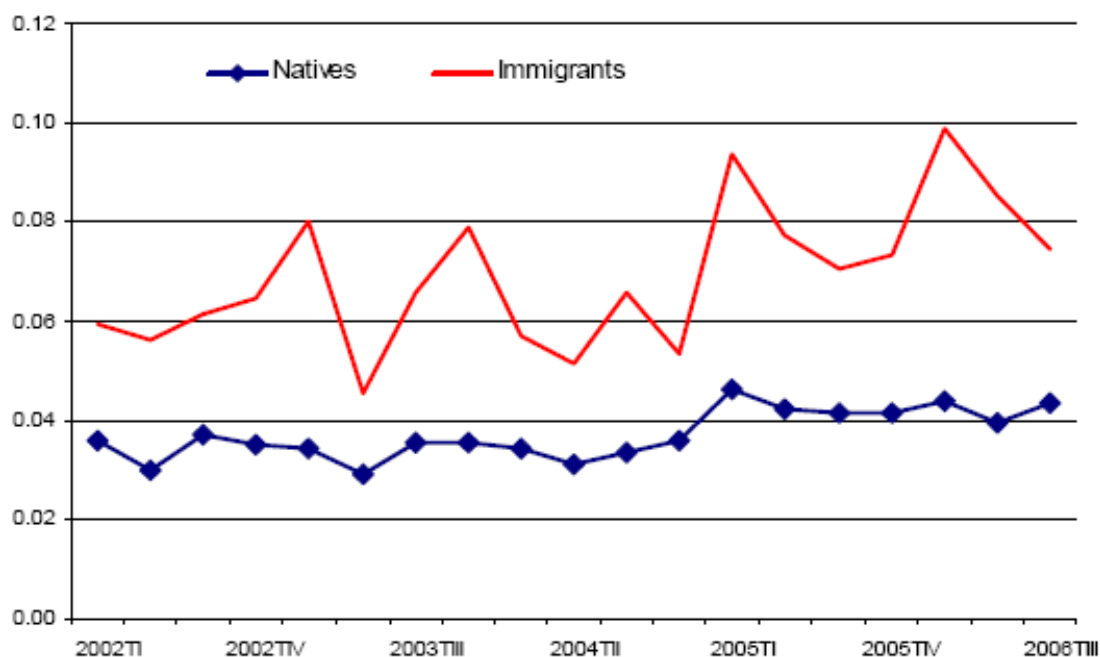
**Figure 2.1**  
**JOB FINDING RATES**



Source: Own elaboration from INE data.

Figure 2.2 shows that the job exit rate for immigrants exceeds the corresponding rate for native people. On average, the job exit rate of immigrants (0.069) is practically double the rate for native people (0.037). Also, the rate at which immigrants lose jobs shows greater variability than that for native people, showing seasonal peaks in the fourth quarter and troughs in the first.

**Figure 2.2**  
**JOB EXIT RATES**



Source: Own elaboration from INE data.

Summarizing, we find that both the job finding rate and the job exit rate, are lower for native people than immigrants. These results imply that the duration of unemployment for immigrants is shorter but they lose their jobs more quickly. In addition, given the presence of a low increment in the job separation rates, the observed increment in job finding rates can be considered the main cause of the decline in the unemployment rate for both groups of workers during the whole period.

Controlling by gender, education, age and sector of activity, the results remain unchanged. The only exception is the job finding rate for women, which is practically the same for native people and for immigrants. Table 2.3 presents the results for different groups.

Regarding the assimilation process, in terms of job finding and separation rates, table 2.4 shows that the job finding rates of native people and immigrants with more than five years in Spain are similar (on average 0.306 and 0.294). However, the average job finding rate for immigrants with less than five years in Spain (0.382) is 0.076 points higher than that for native people.

**Table 2.3**  
**JOB FINDING AND JOB EXIT RATES. AVERAGE 2002-2006**

Job Finding Rate						Job Exit Rate					
Native people			Immigrants			Native people			Immigrants		
All Nat.			All Imm.			All Nat.			All Imm.		
0.306			0.347			0.037			0.069		
16-34	35-54	+ 54	16-34	35-54	+ 54	16-34	35-54	+ 54	16-34	35-54	+ 54
0.351	0.255	0.178	0.374	0.304	0.065	0.064	0.023	0.012	0.095	0.053	0.030
L-skill	H-skill		L-skill	H-skill		L-skill	H-skill		L-skill	H-skill	
0.306	0.311		0.350	0.343		0.043	0.028		0.080	0.065	
Const.	Serv.	Others	Const.	Serv.	Others	Const.	Serv.	Others	Const.	Serv.	Others
0.412	0.346	0.380	0.487	0.386	0.442	0.037	0.042	0.028	0.074	0.066	0.057
Women	Men		Women	Men		Women	Men		Women	Men	
0.301	0.339		0.301	0.402		0.031	0.069		0.055	0.083	

Source: Own elaboration from INE data.

**Table 2.4**  
**ANNUAL AVERAGE 2002-2006**

	Job Finding Rate			Job Exit Rate		
	Native people	New immigrants	Old immigrants	Native people	New immigrants	Old immigrants
2002	0.232	0.236	0.188	0.034	0.087	0.060
2003	0.241	0.336	0.232	0.034	0.081	0.051
2004	0.292	0.357	0.172	0.034	0.076	0.059
2005	0.383	0.517	0.459	0.043	0.098	0.080
2006	0.375	0.446	0.405	0.042	0.100	0.081
Average	0.305	0.378	0.291	0.037	0.088	0.065

Source: Own elaboration from INE data.

Concerning the job destruction process, we can observe that new immigrants have higher separation rates than old immigrants (on average 0.088 and 0.065, respectively). They also show higher job separation rates than native workers (0.037). As a result of the complexity of the immigration process, it is difficult to find a single explanation to capture the full picture of this phenomenon. Some of the hypotheses which commonly appear in the literature could help us to explain our results.

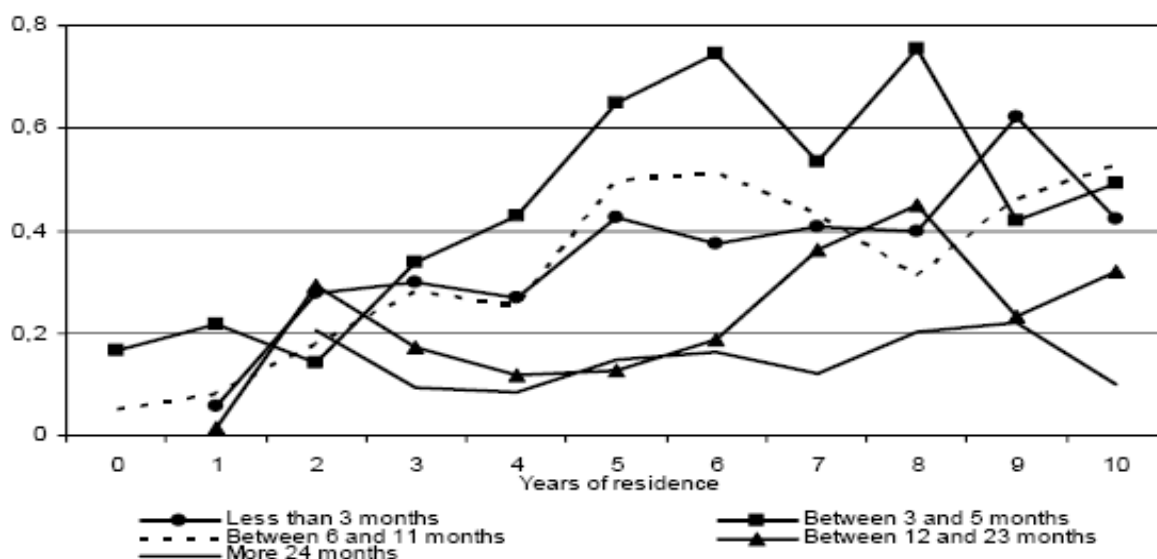
Firstly, there are differences in human capital endowments between native people and immigrants. These differences often appear as a consequence of the problems that immigrants have with having their formal qualifications recognized. Secondly, the employment of immigrants is distributed as follows: services (60%), construction (24%), manufacturing (10%) and agricultural sector (6%). This concentration on services and construction leads to an over-representation of immigrants in jobs with poor working conditions and high turnover rates. See in table 2.1 the proportion of temporary jobs among immigrants. Finally, migration is not permanent, the empirical evidence tells of return migration<sup>5</sup>.

With respect to the Spanish case, we can also document important differences in terms of coverage rates among immigrants by year of residence and time unemployed, which can help us to explain why new immigrants show a higher job finding rate.

The following two figures shed some light on differences in coverage rates. The first (figure 2.3) shows that the coverage rate grows as the years of residence increase, despite the duration of unemployment for individuals. Figure 2.4 provides evidence that the new immigrants' coverage rate is lower than the rate for incumbent immigrants and native people. Moreover, incumbent immigrants and native people show, on average, similar coverage rates.

**Figure 2.3**

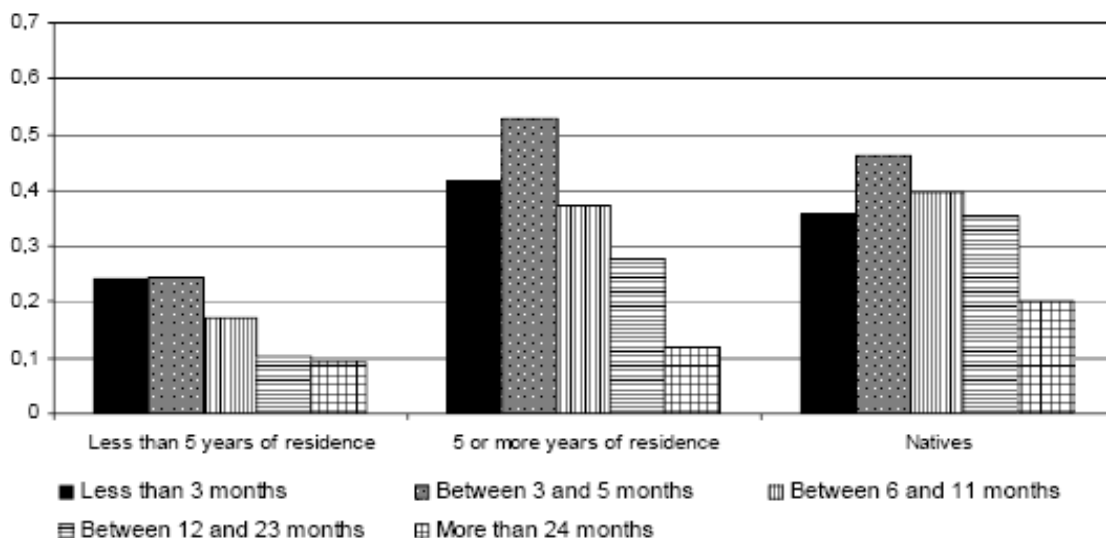
**COVERAGE RATE BI YEARS OF RESIDENCE AND TIME UNEMPLOYED**



Source: Own elaboration from INE data.

<sup>5</sup> See Warren and Peck (1980), Borjas and Bratsberg (1996) and Dustmann and Weiss (2007) for more evidence on return migration.

**Figure 2.4**  
**COVERAGE RATE FOR NEW INMIGRANTS, OLD INMIGRANTS**  
**AND NATIVE PEOPLE BY TIME UNEMPLOYED**



Source: Own elaboration from INE data.

### 3. THE MODEL

In this section we develop a matching model with search intensity in order to capture the differences in the job finding rates between native people and immigrants under a scenario of unemployment assimilation in Spain.

As in Lumpe and Weigert (2007), this economy is populated by a mass one of identical risk-neutral native workers  $N=1$  and by foreign-born workers (immigrants)  $I \geq 0$  adding to give the total population  $L = 1+I$ . All workers and firms discount future payoffs at a common rate  $r$ . In addition, time is continuous.

Native workers ( $n$ ) enter and exit the labor market due to births and retirements at a constant rate  $\delta_n > 0$  such that the number of native workers is constant over time. There are two groups of immigrants. The first group are new immigrants ( $e$ ) entering to the country's labor market at a rate:  $\mu > 0$  and leaving it at a rate:  $\gamma_e > 0$ . These workers have less work experience in the host country captured through lower productivity than native workers:  $p_e = p(1-\xi)$ . It is assumed that  $\xi$  is a pure country's on-the-job assimilation cost for new immigrants. The second group of immigrants are assimilated workers ( $i$ ), who are, as in the case of native people, fully productive workers ( $p_i = p_n = p$ ). An



important difference between incumbent immigrants and native people arises from the presence of a constant rate of return migration  $\gamma_i > 0$ .

Once they find a job, new immigrants become assimilated workers at a constant hazard rate:  $\iota$ . Both, new and incumbent immigrants have the same job retirement rate as native-people:  $\delta_n$ . Thus, the total exit rates for new and incumbent immigrants are  $\delta_e = \delta_n + \gamma_e$  and  $\delta_i = \delta_n + \gamma_i$ , respectively. The net flow of new and incumbent immigrants can therefore be calculated as:

$$\dot{l}_e = \mu - \delta_e l_e - \iota(l_e - u_e), \quad (5)$$

$$\dot{l}_i = \iota(l_e - u_e) - \delta_i l_i, \quad (6)$$

where the number of immigrants in the host country is  $l = l_i + l_e$ .

Native and immigrant workers can be either unemployed or employed. Following Pissarides (2000), unemployed workers have search intensity. Let  $s_j$ , with  $j = n, e, i$ , be a variable measuring the intensity of search by each type of unemployed workers. There is a time-consuming and costly process of matching workers and job vacancies, which is captured by a standard constant-return-to-scale matching function  $m(su, v) = (su)^\alpha v^{1-\alpha}$ , where  $u$  denotes the unemployment rate,  $s$  defines the average job searching intensity and  $v$  is the vacancy rate with elasticity  $1-\alpha$ . Hence the rate at which each group of unemployed workers find jobs is  $f_j(s_j, \theta) = s_j m(1, \theta)$ , where  $\theta = \frac{v}{su}$  is the efficient vacancy-unemployment ratio. Unemployed workers incur convex job search costs  $\sigma_j(s_j, z_j) = z_j \phi_j s_j^\omega$ , which are expressed in terms of unemployment income ( $z_j$ ). We assume that the search cost parameter  $\phi$  is higher for new immigrants ( $\phi_e > \phi_i = \phi_n > 0$ ) because they have fewer networks and job searching experience in the host country's labor market.

As there is no search intensity from the firm's side, vacancies are filled at the hazard rate  $q(\theta) = m(\frac{1}{\theta}, 1)$ . Native people, new and old immigrants lose their jobs at the rates  $\rho_n$ ,  $\rho_e$  and  $\rho_i$ , respectively. Immigrants, especially the new ones, are more likely to be employed in temporary and irregular jobs, then they have higher job destruction rate  $\rho_e > \rho_i > \rho_n$ . So, the unemployment of new and incumbent immigrants ( $u_e$  and  $u_i$ , respectively) and native people ( $u_n$ ) evolves according the following differential equations,

$$\dot{u}_e = \lambda\mu + \rho_e(l_e - u_e) - f_e(s_e, \theta)u_e - \delta_e u_e, \quad (7)$$

$$\dot{u}_i = \rho_i(l_i - u_i) - f_i(s_i, \theta)u_e - \delta_i u_i, \quad (8)$$

$$\dot{u}_n = \rho_n(1 - u_n) - f_n(s_n, \theta)u_n - \delta_n u_n, \quad (9)$$



where the native people and immigrants unemployment rates are  $u_n$  and  $u_i = \frac{u_e + u_i}{l_e + l_i}$ , respectively. The parameter  $\lambda$  captures the proportion of new immigrants entering to unemployment when they arrive in the country<sup>6</sup>.

The values for the different unemployment  $U_j$  and employment  $W_j$  statuses (with  $j = e, n, i$ ) are given by the following expressions:

$$rU_e = z_e - \sigma_e(s_e, z_e) + f_e(s_e, \theta)(W_e - U_e) - \delta_e U_e, \quad (10)$$

$$rU_i = z_i - \sigma_i(s_i, z_i) + f_i(s_e, \theta)(W_i - U_i) - \delta_i U_i, \quad (11)$$

$$rU_n = z_n - \sigma_n(s_n, z_n) + f_n(s_n, \theta)(W_n - U_n) - \delta_n U_n, \quad (12)$$

$$rW_e = w_e + \rho_e(U_e - W_e) + \iota(W_i - W_e) - \delta_e W_e, \quad (13)$$

$$rW_i = w_i + \rho_i(U_i - W_i) - \delta_i W_i, \quad (14)$$

$$rW_n = w_n + \rho_n(U_n - W_n) - \delta_n W_n, \quad (15)$$

If a worker is unemployed, he gets flow income  $z_j = \tau_j \bar{w}_j$ , which is equal to the product of the average wage ( $\bar{w}_j$ ) and the effective replacement ratio  $\tau_j$ . Unemployed workers find jobs at rate  $f_j(s_j, \theta)$ , which yields a net value gain  $W_j - U_j$ . Employed workers earn the endogenous wage  $w_j$ . For each worker, the expected capital loss from losing their job is  $U_j - W_j$ . The assimilation process of new immigrants entails capital gain  $(W_i - W_e)$ . Notice that only employed workers become assimilated. Additionally, if there is no assimilation process ( $\iota = 0$ ) there will be only one type of immigrant, with a higher separation rate, higher search costs, and lower labor productivity. When unemployed and employed workers retire from the labor market they incur a capital loss  $U_j$  and  $W_j$ , respectively.

Firms have a constant-return-to-scale production technology that uses only labor. A job can be either filled or vacant. Job creation takes place when a firm and a worker meet and agree on an employment contract. However, before a position is filled, the firm has to open a job vacancy, with flow cost  $c$ . Each filled job yields instantaneous productivity, which is either  $p_e$  for a new immigrant or  $p > p_e$  for other workers. The interpretation of this assumption is that an assimilation process is needed before new immigrants can reach the productivity of native people.

Thus, the value of vacancies,  $V$ , and filled positions,  $J_j$  are represented by the following Bellman equations:

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<sup>6</sup> As the number of native people has been standardized to one, the number of unemployed native people coincides with their unemployment rate.



$$rV = -c + q(\theta)(J^T - V), \quad (16)$$

$$rJ_e = p_e - w_e + (\rho_e + \delta_e)(V - J_e) + \iota(J_i - J_e), \quad (17)$$

$$rJ_i = p - w_i + (\rho_i + \delta_i)(V - J_i), \quad (18)$$

$$rJ_n = p - w_n + (\rho_n + \delta_n)(V - J_n), \quad (19)$$

where  $J^T = \eta_e J_e + \eta_i J_i + \eta_n J_n$  is the average expected present value of a filled job and  $\eta_j = \frac{s_j u_j}{s_e u_e + s_i u_i + s_n u_n}$  are the searching efficiency share for each type of unemployed group of workers.

To close the model, we first need to incorporate three more assumptions. One is the free entry condition for vacancies: firms will open vacancies until the expected value of doing so becomes zero,  $V = 0$ . Thus, using (16) the firm's job creation condition becomes,

$$J^T = \frac{c}{q(\theta)}. \quad (20)$$

The second assumption is that wages are set through Nash bargaining. In difference to Walrasian models (when factor markets are competitive and labor is paid its marginal product) in the matching framework neither worker nor employer can instantaneously or costless find an alternative match partner in the labor market, a match surplus exists. Some type of bargaining must be considered to divide this surplus. We use a Nash bargaining solution. This solution is equal to the wage that maximizes the weighted product of the worker's and firm's net return from the job match.

$$\max_w = (W - U)^\beta - (J - V)^{1-\beta},$$

where  $\beta \in (0, 1)$  denotes workers bargaining power relative to firms.

Thus, the first-order conditions for immigrant and native employees yield the following three conditions,

$$(1 - \beta)(W_e(w_e) - U_e) = \beta(J_e(w_e) - V), \quad (21)$$

$$(1 - \beta)(W_i(w_i) - U_i) = \beta(J_i(w_i) - V), \quad (22)$$

$$(1 - \beta)(W_n(w_n) - U_n) = \beta(J_n(w_n) - V), \quad (23)$$

where  $\beta \in (0, 1)$  denotes workers bargaining power relative to firms.

Finally, each type of unemployed worker chooses search intensity  $s_j$  to maximize the present-discounted value of their expected income  $U_j$  during the search, taking the other market variables as given. Each optimal  $s_j$  satisfies,

$$\frac{\partial f_e(s_e, \theta)}{\partial s_e} (W_e - U_e) = \frac{\partial \sigma_e(s_e, z_e)}{\partial s_e}, \quad (24)$$

$$\frac{\partial f_i(s_i, \theta)}{\partial s_i} (W_i - U_i) = \frac{\partial \sigma_i(s_i, Z_i)}{\partial s_i}, \quad (25)$$

$$\frac{\partial f_n(s_n, \theta)}{\partial s_n} (W_n - U_n) = \frac{\partial \sigma_i(s_i, Z_n)}{\partial s_i}. \quad (26)$$

Using (10)-(15), the job finding rates  $f_j(s_j, \theta) = s_j m(1, \theta)$  and the job search costs function  $\sigma_j(s_j, Z_j) = z_j \phi_j s_j^\omega$ , equations (24)-(26) can be explicitly solved for the immigrant and native search intensities  $s_j$ . In equilibrium, agents will not find it advantageous to change their intensity.

Given the current values of parameters  $(\lambda, \mu, \delta_j, \gamma_j, \phi_j, \rho, \xi, r, \omega, \alpha, \tau_j, c, l, \rho_j)$ , an equilibrium is a set of 32 variables  $(l_e, l_i, u_j, U_j, W_j, J_j, \theta, s_j, w_j, \sigma_j(s_j, Z_j), \eta_j, f_j(\theta, s_j), q(\theta), v)$  that satisfies the steady state values for the flow of immigrants  $(\dot{l}_e = \dot{l}_i = 0)$  in equations (5)-(6), the steady state number of native and immigrant unemployed workers  $(\dot{u}_j = 0)$  from equations (7)-(9), the values of unemployed and employed workers that comes from the Bellman equations (10)-(15), the firms job filled values from Bellman equations (17)-(19), the job creation condition (20), the first-order conditions of immigrant and native wages (21)-(23), the optimal equilibrium condition for search intensities  $(s_j)$  from equations (24)-(26), the job finding rates for each group of unemployed workers  $(f_j(\theta, s_j) = s_j \frac{(su)^\alpha v^{1-\alpha}}{su})$ , the filling rate for vacancies  $(q(\theta) = \frac{(su)^\alpha v^{1-\alpha}}{v})$ , the job search costs  $(\sigma_j(s_j, Z_j) = z_j \phi_j s_j^\omega)$ , the immigrant and native efficiency searching shares in unemployment  $(\eta_j = \frac{s_j u_j}{s_e u_e + s_e u_i + s_n u_n})$ , and the number of vacancies  $v = (su)\theta$ .

#### 4. CALIBRATION

We calibrate the model at quarterly frequency to be consistent with some empirical Spanish labor markets facts. In particular, the parameterization must match the average unemployment rate of native people observed between 2002 and 2006 ( $u_n = 0.10$ ), as well as the average wage differential of 20.7 percent between immigrant and native workers.

The labor productivity of native people is normalized to  $p = 1$ . The real interest rate is fixed at  $r = 0.012$ , which is consistent with available empirical work. Based on Castillo *et al.* (1998) we set  $\alpha = 0.85$ . In accordance with Abowd and Kramarz (2003), who estimates hiring costs per hire to be 3 percent



of the yearly labor cost of an average worker in France, we set the hiring cost parameter  $c$  at 9 percent of normalized labor productivity,  $c = 0.09$ . From data, the native people' entry rate into the labor market  $\delta_n$  and the job separation rate  $\rho_n$  are set to 0.004 and 0.037, respectively. According to table 2.4, the average job separation rates for new and assimilated immigrants are  $\rho_e = 0.088$  and  $\rho_i = 0.065$ , in each case.

From the Public State Employment Services (INEM), we consider the unemployment insurance replacement ratio for those workers with less than 180 days unemployed (70 percent). On the other hand, we estimate the coverage rate separately for native people, new and incumbent immigrants, obtaining 31.8 percent for native people and incumbent immigrants and 20.8 percent for new immigrants<sup>7</sup>. Thus, the flow utility of being unemployed is set at 22.3 percent of wages for native people and incumbent immigrants ( $\tau_n = \tau_i = 0.223$ ) and 14.6 percent for new immigrants ( $\tau_e = 0.146$ ). The workers bargaining power ( $\beta$ ) is one half.

With respect to the assimilation process of new immigrants, the parameter  $\iota$  is calculated as the inverse of the number of periods that a new immigrant delays assimilation. From Fernandez and Ortega (2008) we establish that in five years the assimilation costs of new immigrants, in terms of labor productivity and job search costs, disappear. To express this parameter in quarters we have to divide by four. Then our  $\iota$  is equal to  $1/(5 * 4) = 0.05$ .

The literature documents that return migration is high during the early years of residence in the host country. In particular, the paper of Warren and Peck (1980) reports that 18 percent of the 1960 foreign-born population emigrated between 1960 and 1970, and the return migration for those who entered in the sixties was 5.2 percent. Taking into account this evidence we set the corresponding quarter parameters  $\gamma_e$  and  $\gamma_i$  to 0.011 and 0.0025 respectively.

Regarding the parameters associated with the assimilation costs of new immigrants, we set the productivity gap ( $\xi$ ) and the searching costs parameter ( $\phi_e$ ) to match the average wage differential between immigrants and native workers. The wages for the different groups from the population were obtained from the 2005 Living Conditions Survey<sup>8</sup>. Specifically, we obtain figures showing that the wages of foreign-born are 20.7 percent lower than for native people.

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<sup>7</sup> We calculate these coverage rates as the number of unemployed workers, who receive a contributive unemployment benefit, divided by the number of unemployed. We use data from Spanish Labor Force Survey.

<sup>8</sup> The monetary benefit for the wage earners and self-employed workers were considered. The gross rents were obtained by means of the methodology developed in Levy and Mercader-Prats (2003).

We then set  $\xi = 0.18$  and  $\phi_e = 1.15\phi_n$ <sup>9</sup>. In other words, new immigrants' productivity is 18 percent lower and job search costs are 15 percent higher than for native workers.

To close the calibration, the elasticity of the job search costs function  $\omega$  and the search cost parameter for native people and assimilated immigrants  $\phi_n = \phi_i$  are set to match the average unemployment and the job creation condition. Thus,  $\omega = 1.25$  and  $\phi_n = \phi_i = 100$ . All the parameters are summarized in table 4.1.

**Table 4.1**  
**BASELINE PARAMETERS**

Natives											
$\delta_n$	$\rho$	$c$	$\alpha$	$\rho_n$	$r$	$\beta$	$\tau_n$	$\omega$	$\phi_n$		
0.004	1	0.09	0.85	0.037	0.012	0.50	0.223	1.25	100		
Immigrants											
$\mu$	$\lambda$	$\iota$	$\gamma_e$	$\gamma_i$	$\phi_e$	$\phi_i$	$\xi$	$\rho_e$	$\rho_i$	$\tau_e$	$\tau_i$
0.0056	0.56	0.05	0.011	0.0025	115	100	0.18	0.088	0.065	0.146	0.223

Source: Own elaboration from INE data.

To capture the immigration flow, we obtain the average entry rate of immigrants ( $\mu$ ) to the Spanish labor market from data. Specifically, we approximate  $\mu$  through the change in immigrant labor force in relation to the number of native labor force. So, from first quarter of 2002 until the fourth quarter of 2006 the relative number of immigrants increased by 0.56% ( $\mu = 0.0056$ ). According to the Spanish Ministry of Labor and Foreign Affairs, each year 200,000 immigrants arrive in the country with a labor contract. Given that the labor force of immigrants increases by 454,000 per year, the proportion of new immigrants arriving to the country with a job is around 44 percent. So, the proportion of new immigrants entering to unemployment when they arrive in the country is  $\lambda = 0.56$ .

## 5. SIMULATION RESULTS

In this section, we perform a numerical simulation of the model in order to gain some insights into the effects of the immigration process in the Spanish labor market from 2002 to 2006. Table 5.1 shows results from the simulation.

<sup>9</sup> This result is confirmed by Simon *et al.* (2008) who finds that the average wage of immigrants from developing countries, is 29.2 percent lower than native people's wages.

**Table 5.1**  
**DATA AND SIMULATE RESULTS. AVERAGE 2002-2006**

	$u_n$	$\frac{u_e}{l_e}$	$\frac{u_i}{l_i}$	$f_n$	$f_e$	$f_i$	$s_n$	$s_e$	$s_i$
Data	0.100	0.145	0.128	0.306	0.382	0.294	n.a	n.a	n.a
Simulated results	0.101	0.215	0.153	0.362	0.471	0.353	0.176	0.230	0.172

Clearly, the model reproduces the gap in the job finding rate between new immigrants and native people, with a simulated gap of 10.9 percentage points compared to 8.3 in the data. Similarly, the model captures the similar job finding rates between native people and assimilated immigrants (0.362 and 0.353, respectively), although it clearly overestimates their observed values (0.306 and 0.294, respectively). Finally, the baseline simulation presents an unemployment gap of 5.63 percentage points between assimilated immigrants and native people, which is above to the observed value of 2.8 percentage points. Finally, the benchmark model clearly overestimates the unemployment rate of new immigrants (0.215, which is above the actual 0.145).

The higher average job finding rate of immigrants with less than five years in the country compared to native people occurs because the former group of workers shows a search intensity rate of 0.23, which is 31 percent higher than the job search intensity rate of natives (0.176). In contrast, assimilated immigrants search for jobs with the same intensity to that observed in native people.

## 6. SENSITIVITY ANALYSIS

In this section we present the results of a sensitivity analysis with respect to the main parameters related to immigration process. Firstly, we eliminate the return migration rate for both, new and incumbent immigrants ( $\gamma_e$  and  $\gamma_i$ ), and then equalize their job separation rates ( $\rho_e$  and  $\rho_i$ ) to the one for native people ( $\rho_n$ ). Secondly, we eliminate the country assimilation costs in terms of productivity ( $\xi$ ) and search efficiency ( $\phi_e$ ). Thirdly, the new immigrants replacement ratio with respect to unemployment insurance ( $\tau_e$ ) is set equal to the one for native people ( $\tau_i$ ). Finally, we increase the immigration assimilation rate ( $\iota$ ).

As before, we reproduce the immigration boom through the observed change in the number of immigrant's of working age population with respect to the number of native people ( $\mu$ ). Thus, the average steady-state values of  $u_j$ ,  $f_j$  and  $s_j$  are adjusted in accordance with these changes.

As shown in Table 6.1, there is no significant sensitivity of unemployment and job finding rates to changes in return migration rates ( $\gamma_e$  and  $\gamma_i$ ), or in the country assimilation costs in terms of productivity ( $\xi$ ).

**Table 6.1**  
**SIMULATED RESULTS FOR THE SENSITIVITY ANALYSIS.**  
**AVERAGE 2002-2006**

Simulated Results									
Parameters	$u_n$	$\frac{u_e}{l_e}$	$\frac{u_i}{l_i}$	$f_n$	$f_e$	$f_i$	$s_n$	$s_e$	$s_i$
$\gamma_e = \gamma_i = 0$	0.101	0.194	0.151	0.362	0.500	0.362	0.177	0.249	0.177
$\rho_e = \rho_i = \rho_n = 0.037$	0.100	<b>0.141</b>	<b>0.092</b>	0.369	0.480	0.359	0.177	0.231	0.172
$\xi = 0$	0.101	0.215	0.153	0.363	0.473	0.354	0.177	0.230	0.172
$\phi_e = \phi_i = \phi_n = 100$	0.101	0.194	0.153	0.362	<b>0.539</b>	0.352	0.177	<b>0.263</b>	0.172
$\tau_e = \tau_i = \tau_n = 0.146$	0.068	0.221	<b>0.105</b>	<b>0.561</b>	0.455	<b>0.551</b>	<b>0.282</b>	0.228	<b>0.277</b>
$\iota = 0.1255$	0.101	<b>0.274</b>	0.153	0.363	0.473	0.354	0.177	0.230	0.1172
Benchmark economy	0.101	0.215	0.153	0.362	0.471	0.353	0.176	0.230	0.172

In turn, the presence of higher job search costs for new immigrants reduces their job search intensity and, therefore, their job finding rate. Specifically, when these costs are increased by 15 percent, the job search intensity decreases by 15.8 percent, from 0.263 to 0.230, while their job finding rate decreases from 0.539 to 0.471 (12.6 percent). This result goes in line with the hypothesis that immigrant job search is more successful as the number of years since immigration increases (Chiswick, 1982).

But, how can new immigrants with higher search costs (due to their limited knowledge of the local labor market institutions (Chiswick, 1982) or the presence of smaller social networks (Beggs and Chapman, 1990) show a higher job finding rate than native people in Spain?

An answer to this question is as follows: new immigrants search for jobs with greater intensity because they have lower coverage rate than native people. Notice that when the coverage rate of native workers and assimilated immigrants decreases (from 0.223 to 0.146), their job search intensity rates become higher with respect to the simulated rate for new immigrants. Associated with this hypothesis, it is well known that new immigrants show a higher participation rate in the labor market and lower requirements for accepting jobs.

The sensitivity analysis also shows that the unemployment rate for old immigrants is higher than the unemployment rate of native people due only to the presence of a higher job separation rate. In more detail, if the job separation rate for assimilated immigrants were equal to that observed in native people, then the unemployment rate of this group of workers would be even lower (0.092 with respect to 0.10, respectively).

Finally, if the assimilation rate ( $\iota$ ) increases, the unemployment rate for new immigrants ( $u_e = \frac{u_e}{l_e}$ ) goes up. To understand this result, note that, in order to become an assimilated worker, a new immigrant needs to find a job first. Thus, given the number of new immigrants unemployed ( $u_e$ ), a higher job assimilation rate ( $\iota$ ) reduces the labor force of this group of workers ( $l_e$ ) since a higher number of newly employed workers becomes assimilated. Thus, the ratio of  $\frac{u_e}{l_e}$  increases.

## 7. FINAL COMMENTS

In this paper we evaluate the performance of native people and immigrants in Spanish labor market from 2002 to 2006 using the flows approach developed by Shimer (2005). We have found that the immigrants' job finding rate, and its variability, are greater than those for native people. Moreover, the job exit rate is also higher for immigrants than for native workers. The increment observed in the job finding rate and the practically unchanged value in the job exit rate suggest that the former is the key variable to understanding the decline in the unemployment rate observed during the period.

With regard to the assimilation process we found that the job finding rates of native people and old immigrants are, on average, similar. The high job finding rate of immigrants is explained, then, by the higher job finding rate of new immigrants. New immigrants also show higher destruction rates than native people. These findings support the assimilation process hypotheses in terms of unemployment recently reported by Fernandez and Ortega (2008) and Amuedo-Dorantes and de la Rica (2007).

Finally, we develop and calibrate a search and matching with three different agents (native people, new and old immigrants) and a positive return migration rate. Our model is able to reproduce the observed differences in unemployment rates and, in particular, in the job finding rates, among the different agents. However, our benchmark model clearly overestimates the level of these variables.



The benchmark model is able to reproduce the differences in the job finding rates between immigrants and native people. Because the former group of workers present a relatively low unemployment coverage rate, they look for jobs more intensively and they have fewer requirements for accepting jobs. In contrast, the job finding rate of old immigrants is similar to that for native people because they have similar unemployment coverage rates. We also carried out a sensitivity analysis with results showing that the other parameters, such as the country-specific skills, job search costs, separation and return migration rates have only a marginal effect on the job finding rates of these groups.



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## SÍNTESIS

### PRINCIPALES IMPLICACIONES DE POLÍTICA ECONÓMICA

En el presente documento estudiamos el proceso de asimilación (en términos de empleo) de los inmigrantes en España durante el período 2002-2006. Además de la heterogeneidad propia relacionada con el origen de los trabajadores, se diferencia a los inmigrantes por el año de llegada a España.

Basados en la metodología de flujos de entrada y salida de empleo de Shimer (2005), y con datos de la Encuesta de Población Activa (EPA), se calculan las tasas a las que los diferentes agentes encuentran y pierden empleo (job finding rates y job exit rates). Se observa que los nuevos inmigrantes (aquellos que tienen menos de cinco años de residencia en España) encuentran y pierden sus trabajos a una mayor tasa que los nativos. Contrariamente, los viejos inmigrantes (inmigrantes que llevan más de cinco años en España) encuentran trabajo a una tasa similar que los nativos. Sin embargo, su tasa de pérdida de empleo es mayor a la de éstos pero menor a la de los nuevos inmigrantes.

A la vista de los resultados encontrados, la segunda parte del trabajo pretende identificar los mecanismos que intervienen en la dinámica de las tasas para los diferentes grupos considerados. Esto es, analizar los factores que explican la mayor tasa de emparejamiento laboral de los nuevos inmigrantes respecto los viejos inmigrantes, y la tasa similar de emparejamiento de estos últimos respecto a los nativos.

Con este objetivo, se presenta un modelo teórico de búsqueda y emparejamiento, que supone distintas intensidades de búsqueda de trabajo entre los distintos grupos y además, considera que éstos compiten en el mercado de trabajo. Basándose en otros estudios previos, y en la evidencia empírica reciente de la economía española, se supone que los nuevos inmigrantes, respecto a los nativos, tienen una menor tasa de cobertura por prestación de desempleo, mayores costes de búsqueda de empleo, menor productividad laboral, mayores tasas de separación de sus puestos de trabajo y una tasa positiva de retorno a sus países de origen. Por otra parte, también se considera que los nuevos inmigrantes logran, en un promedio de 5 años, un proceso de asimilación laboral en términos de productividad, cobertura por prestación de desempleo, y en los costes de búsqueda de empleo. Finalmente, se supone que los viejos inmigrantes y nativos se diferencian únicamente porque los primeros tienen una probabilidad positiva de retorno a sus países de origen.

La calibración y simulación del modelo permite reproducir las diferencias observadas en las tasas a las cuales los distintos grupos de trabajadores encuentran trabajo. A partir de un análisis de sensibilidad de los parámetros relevantes del modelo, se concluye que la mayor tasa de emparejamiento laboral observada en los nuevos inmigrantes se debe, fundamentalmente, a una menor cobertura por desempleo, lo que induce a éstos a buscar empleo con mayor intensidad que el resto de trabajadores.



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***Junto al original del Papel de Trabajo se entregará también un resumen de un máximo de dos folios que contenga las principales implicaciones de política económica que se deriven de la investigación realizada.***





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