The ins and outs of unemployment and the assimilation of recent immigrants in Spain *

José I. Silva† Javier Vázquez‡

Draft: April 26, 2008

Preliminary

Abstract

In this paper we study the assimilation process (in unemployment terms) of the recent immigration wave in Spain for the span 2002-2006. In addition to the heterogeneity that emerges from the origin of the worker, we differentiate the immigrants by year of arrival to Spain (old and new immigrants). Following Shimer (2007) and using data from the Spanish Labour Force Survey we calculate the probability that an employed worker becomes unemployed and the probability that an unemployed worker finds a job. Over that period immigrants show both higher job-finding and employment exit probability. We also present a search and matching model, where natives, new immigrants and old immigrants compete in labor market. The simulated model is able to reproduce some of the observed differences in unemployment and, in particular, the job-finding probability among these agents.

Keywords: Job-Finding Probability, Employment Exit Probability, Immigrant Assimilation, Search and Matching Models.

JEL Classifications: E24, J61, J64.

*The authors acknowledge the Instituto de Estudios Fiscales (Ministry of Finance, Spain) for their financial support. Javier Vázquez also benefited from the Spanish Science and Technology System (project Nº SEJ2006-04444) and the Catalan Government Science Network (project Nº SGR2005-177 and Xarxa de Referencia d'R+D+I en Economia i Politica Publiques, XREPP).

†Universitat Jaume I de Castelló, Spain. Email:jsilva@eco.uji.es

‡Universitat Autònoma de Barcelona, Spain, and Universidad de la República, Uruguay. Email:javier.vazquez@uab.es

1 Introduction

Until the end of the eighties Spain has been an emigration country,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 about one half million from 1995 to 2005; as a result of international migration, it actually increased by about 2,8 million in a period of strong economic growth (OECD (2007)). Foreign population in Spain has increased from 0,64 millions in 1998 (1,6% of total population) to 4,48 millions in 2007 (9,9% of the total population). This implies an average net flow of five hundred thousands of foreign people a year.

This change in the migration patterns motivate us to investigate the Spanish labor market behavior. In particular, we are interested in understand the labor market assimilation process of immigrants widely studied in immigration literature[1] and recently documented by Amuedo-Dorantes and de la Rica (2007) and Fernandez and Ortega-Masague (2006).

More in detail, and 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 course of the first 5 years. During that time period, immigrant men and women improve their employment probability by an average of 10 and 7 percentage points, respectively. Similarly, and using data from the Spanish Labour Force Survey (*Encuesta de Población Activa*)[2] for the period 1996-2006, Fernandez and Ortega-Masague (2006) show that 5 years after arrival the immigrants probability of being unemployed is similar or even lower with respect to the natives one.

In contrast to the employment an unemployment probabilities for immigrants relative to native-born individuals estimated by these authors, we first analyze the immigrants assimilation process using the flows approach developed by Shimer (2007). In particular, using data

[1]Chiswick (1978) found that the gap between the earnings of natives and immigrants is reduced, or even disappears, as immigrants residency in U.S. is lengthens. Borjas (1985) questioned these results by the use of cross-section data. Using census data he concludes that while growth rates of the earnings of immigrants are higher than that of natives, these are lower than those found in the cross-sectional analysis.

[2]The Spanish Labour Force Survey is a quarter household survey that interviews 65.000 households each period (about 180.000 individuals). Each household remains into the sample six periods, then a sixth is renewed each quarter.

from the Spanish Labor Force Survey for the period 2002-2006 we calculate the job-finding probability and the separation probability and provide evidence about the different success of immigrants and natives in the labor market. Finally, we present a search and matching model with native workers and two types of immigrants: (i) New immigrants who are those workers with higher separation rate, less country specific skills, higher job searching costs, lower unemployment coverage rate and partial return migration rate to their countries of origin; and (ii) Old immigrants with the same skills level, job searching costs and unemployment coverage rate than native workers but, as in the case of new immigrants, with positive return migration rate and therefore higher job separation rate. We simulate the model by reproducing the relative increment of immigrants to natives observed in the Spanish labour force.

The simulated results of our model can reproduce some stylized facts of the Spanish labor market. First, the job finding probability of a new immigrant is higher than the same probability for natives. This happens because the former group of workers presents a relatively lower coverage rate, so they looks for jobs more intensively and have lower requirements to accept jobs. Second, new immigrants show higher unemployment rate with respect to old immigrants. We ascribe this result to the presence of higher separation rate and higher job searching costs for new unemployed immigrants, which in turn can be related to their limited knowledge of the local labour market institutions or the presence of smaller social networks than old immigrants and native workers. Finally, despite of being assimilated in terms of country specific skills and job searching costs, we find that the unemployment rate for old immigrants is higher than the unemployment rate of natives only due to the presence of higher job separation probability.

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

2 Spanish Labor Market Facts

2.1 Descriptive Statistics

In this section we present a set of indicators that summarize the functioning of the Spanish labor market, from 2002 until 2006. The period of analysis was elected based on the fact that since 2002, we are able to capture the the effects of the immigration[3] process started during the second half of the nineties.

Table 2.1 displays some characteristics of the working age population. Young natives are more educated than immigrants. However, immigrant people older than 34 is more educated than the same cohort of natives. On average, there are more natives with both, university degree and primary education. The composition by gender is similar in both collectives with a higher proportion of women. Also, the immigrant working age population is, on average, five years younger than natives.

The temporary rate of immigrants practically duplicate the same rate for natives. The 58,15% of immigrants have a temporary contract while among Spaniards this proportion is 29,75%. The novelty of the immigration process in Spain is confirmed by the low average years of residence (3,25).

The unemployment rate is lower for natives than immigrants over the whole period (9,97% and 13,63%, respectively). In addition, the unemployment rate declined significantly over these years for both groups. Concretely, for natives the rate fell from 11,25 % in 2002 to 8,01 % in 2006 and for immigrants the declining was from 15,01 % to 11,88% in the same period. (see Table 2.2)

However, the activity rate is lower for natives than immigrants. In particular, it is important to highlight that the average employment rate of immigrants is 17,4 percent points higher than the rate of natives (66,60% and 49,21% respectively).

Regarding to the assimilation process, in terms of unemployment rate, Table 2.2 shows that unemployment rate of immigrants tends converge to the unemployment rate of natives as long as they spent time in Spain. In the second row of the Table 2.2 we observe that after five years of residence the gap between immigrant and native unemployment rates is reduced in 1,75 percentage points.

[3]In this paper we define immigrant population as those persons born outside UE15.

2.2 Ins and Outs of Unemployment

Shimer (2007) develops measures of the probability that an unemployed worker find a job (job-finding probability) and that an employee loses their job (employment exit probability). Using public data from the U.S. Current Population Survey he computes these probabilities for the period 1948-2007.

Following Shimer's methodology, we consider a two-state model (employed or unemployed) for workers in order to compute the job-finding probability and the employment exit probability for natives and immigrants. We use quarter data from Spanish Labor Force Survey to construct these probabilities. The period considered is from first quarter of 2002 to fourth quarter of 2006. We calculate the total unemployment and the unemployment for less than three months (as a proxy of a short-run unemployment).

In particular, we assume that:

- F_t is the probability that all unemployed workers find a job in quarter t.
- All unemployed workers remains in the active population

Then:

$$u_{t+1} = (1 - F_t)u_t + u^s_{t+1} \tag{1}$$

- u^s_t is the number of workers unemployed for less than three months in quarter t.
- u_t is the total number of workers unemployed in quarter t.

Unemployed workers at the quarter $t+1$ is the sum of the number of unemployed workers at quarter t who fail to find a job plus the number of newly unemployed workers in $t+1$ (u^s_{t+1}).

$$F_t = 1 - \frac{u_{t+1} - u^s_{t+1}}{u_t} \tag{2}$$

We define the employment exit probability from the following backward-looking equation for unemployment.

$$u_{t+1} = X_t e_t + (1 - F_t)u_t \tag{3}$$

A proportion X_t of employed workers lose their job and a proportion F_t of employed workers find a job during the period t, determining the unemployment rate in $t+1$.

In order to compute this probability we use the following data:

- employment
- unemployment
- job-finding probability

Finally, the employment exit probability is:

$$X_t = \frac{u_{t+1} - (1 - F_t)u_t}{e_t} \tag{4}$$

The equation (4) do not allows workers to lose a job and find another, or vice versa, within the same period.[4]

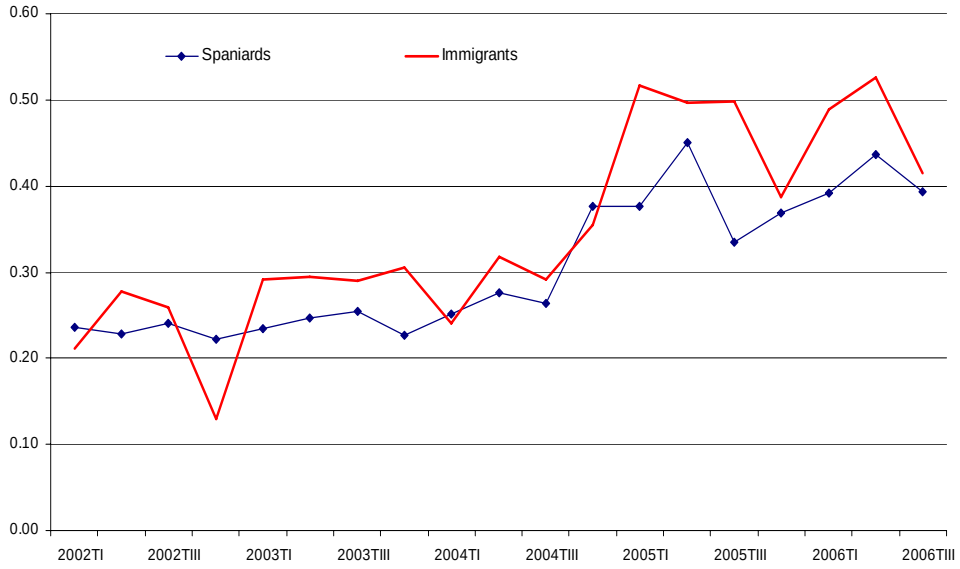
The job-finding probability of immigrants is higher than natives(see Figure 2.1). The averages rate are 0,31 for natives and 0,35 for immigrants. It is important to highlight that the rate increase for both collectives during the period and also the variability (standard deviation) is greater for immigrants than natives, 0,115 and 0,079 respectively.

Using the job-finding probability, the employment and unemployment rates we compute the employment exit probability. Figure 2.2 shows that the employment exit probability for immigrants exceeds that of the natives. Also the probability to lose the job for immigrants presents grater variability than natives rate, showing seasonal peaks in the fourth quarter and troughs in the first.

We find that both the job-finding probability and the employment exit probability are lower for natives. While the job-finding probability is, on average, twelve percent lower for natives, the employment exit probability of immigrants practically duplicate the probability of natives. These results imply that the immigrants unemployment duration is lower but they lose their jobs faster. Additionally, assuming $u_{t+1} - u_t = 0$ in equation (3) we calculate the equilibrium unemployment rate ($u_t^* = \frac{X_t}{X_t + F_t}$). As we can see this equilibrium rate decreases as job finding probability (F_t) is higher and the separation probability (X_t) is lower. Thus, given the absence of a tendency in the job separation probability, the observed increment in the job

[4]We can not use data on gross flows because Spanish Labor Market Survey flows data base does not give information about nationality or country of origin.

Figure 2.1: **Job-Finding Probability**



Source: Own elaboration from INE data.

finding probability can be considered the main cause of the declining in the unemployment rate for both groups of workers during the all period.

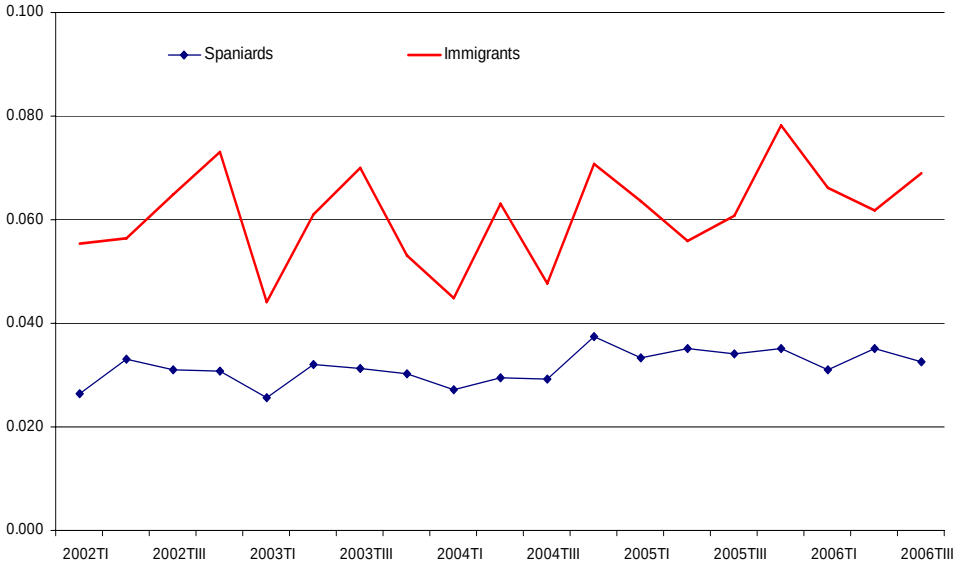
Controlling by gender, education, age and sector of activity the results remain unchanged. The only exception is the job-finding probability for women that is practically the same for natives and immigrants. The Table 2.3 present detailed results for different collectives.

Regarding to the assimilation process, in terms of job finding and separation probabilities, Table 2.4 shows that the job finding probability of natives and immigrants with more than five years in Spain are similar in average (0,306 and 0,294, respectively). However, the average job finding probability of immigrants with less than five years (0,382) is 0,076 points higher than the native's one.

Respect to the job destruction process, we observe that new immigrants have higher separation probabilities than old immigrants (0,071 and 0,054, respectively). They also presents higher job separation probability than native workers (0,032). As a consequence of the complexity of the immigration process, is difficult to find a unique explanation to capture the full picture of this phenomenon. Some of the hypothesis which commonly appears in the literature could help us to explain our results.

First, there are differences in human capital endowments between natives and immigrants.

Figure 2.2: **Employment Exit Probability**



Source: Own elaboration from INE data.

Many times these differences appears as a consequence of the problems that immigrants have with the recognitions of their formal qualifications. Second, 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 poorly working conditions and high turnover rates. See in Table 2.1 the proportion of temporary jobs among immigrants. Finally, migrations are not permanent, the empirical evidence account for return migration.[5]

3 The model

In this section we develop a search and matching model in order to capture the assimilation process of new immigrants observed in Spain, in terms of job finding, separation and unemployment rates.

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

[5]In order to see more evidence on return migration see Warren and Peck (1980), Borjas and Bratsberg (1996) and Dustmann and Weiss (2007).

to the total population $L = 1 + I$. All workers and firms discount future payoffs at common rate r. In addition, time is continuous.

Native workers (n) enter and exit the labor market due to births and retirements at the 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 the rate $\mu > 0$ and leaving it at the rate $\gamma_e > 0$. These workers have less work experience in the host country capture thorough lower productivity than native workers $p_e = p(1 - \xi)$. It is assumed that ξ is a pure country's on-the-job assimilation costs for new immigrants. The second group of immigrants are assimilated workers (i), which are, as in the case of natives, full productive workers ($p_i = p_n = p$). An important difference between incumbent immigrants and natives arises from the presence of a return migration constant rate $\gamma_i > 0$. Once they find a job, new immigrants become assimilated workers at the constant hazard rate ι. Both, new and incumbent immigrants have the same job retirement rate than natives δ_n. Thus, the exit total rates of 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,

$$\dot{I}_e = \mu - \delta_e I_e - \iota(I_e - u_e), \tag{5}$$

$$\dot{I}_i = \iota(I_e - u_e) - \delta_i I_i, \tag{6}$$

where the number of immigrants in the host country is $I = I_i + I_e$.

Native and immigrant workers can be either unemployed or employed. Following Pissarides (2000), unemployed workers have search intensity. Let s_j with $j = i, n, e$ 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 in convex job searching costs $\sigma_j(s_j, z_j) = z_j \phi_j s_j^{\omega}$, which are expressed in terms of the unemployment income (z_j). We assume that the search costs

parameter ϕ is higher for new immigrants ($\phi_e > \phi_i = \phi_n > 0$) because they have less networks and job searching experience in the labor market of the host country.

Since there is not search intensity from the firm's side, vacancies are filled at the hazard rate $q(\theta) = m(\frac{1}{\theta}, 1)$. Natives, new and old immigrants loss their jobs at the rates ρ_n, ρ_e and ρ_i, respectively. Immigrants, especially the new ones, are more likely to be employed in temporal and irregular jobs, then they have higher job destruction rate $\rho_e > \rho_i > \rho_n$. Thus, the unemployment of new and incumbent immigrants (u_e and u_i, respectively) and natives (u_n) evolve according the following differential equations,

$$\dot{u_e} = \mu + \rho_e(I_e - u_e) - f_e(s_e, \theta)u_e - \delta_e u_e, \tag{7}$$

$$\dot{u_i} = \rho_i(I_i - u_i) - f_i(s_i, \theta)u_e - \delta_i u_i, \tag{8}$$

$$\dot{u_n} = \delta_n + \rho_n(1 - u_n) - f_n(s_n, \theta)u_n - \delta_n u_n, \tag{9}$$

where the native and immigrants unemployment rates are u_n and $u_I = \frac{u_e + u_i}{I_e + I_i}$, respectively.[6]

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

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

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

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

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

$$rW_i = w_i + \rho_i(U_i - W_i) - \delta_i W_i, \tag{14}$$

[6]Since the number of natives has been standardized to one, the number of unemployed natives coincide with their unemployment rate.

$$rW_n = w_n + \rho_n(U_n - W_n) - \delta_n W_n, \tag{15}$$

If a worker is unemployed, she gets flow income $z_j = \tau_j w_j$, which is equals to the product of the wage (w_j) to the effective replacement ratio τ_j. Unemployed workers find job at rate $f_j(s_j, \theta)$, which yields net value gain $W_j - U_j$. Employed workers earn the endogenous wage w_j. For each worker, the expected capital loss from loosing the 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 not assimilation process, $\iota = 0$, there will be only one type of immigrants with higher separation rate, more costly searching costs and lower labor productivity. When unemployed and employed workers are retired from the labor market they incur in 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 the rest of workers. The interpretation of this assumption is that an assimilation process is needed before new immigrants can reach the productivity of natives.

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

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

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

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

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

where $J^T = \eta_e J_e + \eta_i J_i + \eta_n J_n$ is the 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 immigrant and native efficiency searching shares in unemployment.

To close the model, we need first 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 job creation condition becomes

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

The second assumption is that wages are set through Nash bargaining. The Nash solution is the wage that maximizes the weighted product of the worker's and firm's net return from the job match. The first-order conditions for immigrant and native employees yield the following three conditions,

$$(1-\beta)(W_e(w_e) - U_e) = \eta_e \beta (J^T(w_e) - V), \tag{21}$$

$$(1-\beta)(W_i(w_i) - U_i) = \eta_i \beta (J^T(w_i) - V), \tag{22}$$

$$(1-\beta)(W_n(w_n) - U_n) = \eta_n \beta (J^T(w_n) - V), \tag{23}$$

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 search, taking the other market variables as given. Each optimal s_j satisfies

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

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

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

Using (10)-(15), the job finding probabilities $f_j(s_j,\theta) = s_j m(1,\theta)$ and the job searching 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 advantageous to change their intensity.

Given the current values of parameters $(\mu, \delta_j, \gamma_j, \phi_j, p, \xi, r, \omega, \alpha, \tau_j, c, \iota, \rho_j)$, an equilibrium is a set of 32 variables $(I_e, I_i, u_j, U_j, W_j, J_j, \theta, s_j, w_j, \sigma_j(s_j, z_j), \eta_j, f_j(\theta, s_j), q(\theta), v)$ that satisfies the steady state values for the flow of immigrants $(\dot{I}_e = \dot{I}_i = 0)$ 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 of vacancies $(q(\theta) = \frac{(su)^\alpha v^{1-\alpha}}{v})$, the job searching costs $(\sigma_j(s_j, z_j) = z_j \phi s_j^{\omega_j})$, 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 $v = (us)\theta$.

4 Calibration

We calibrate the model at quarterly frequency to be consistent with some empirical Spanish labor markets facts. In particular, the parametrization must match the average job finding rate and unemployment rate of natives $(f_n(\theta, s_j) = 0,30$ and $u_n = 0,10$, respectively) observed between 2002 and 2006.

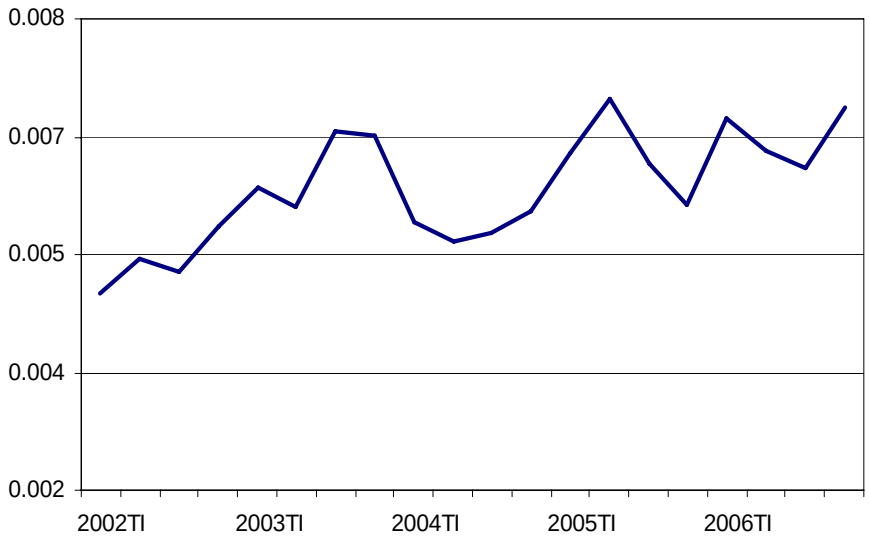
The labor productivity of natives is normalized to $p = 1$. The real interest rate is fixed at r=0,012, which is consistent with available empirical work. Based on Castillo, Jimeno and Licandro (undated) we set $\alpha = 0,85$. In accordance to Abowd and Kramarz (2003), who estimate hiring costs per hire to be 3,3% of the yearly labor cost of an average worker in France, we set the hiring cost parameter c at 12% of the normalized labor productivity, $c = 0,12$. From data, the natives entry rate to the labor market δ_n and the job separation rate ρ_n are set to $0,004$ and $0,03$, respectively. According to Table 2.4, the average job separation rates for new and assimilated immigrants are $\rho_e = 0.07$ and $\rho_i = 0.05$, in each case.

Following Dolado, Jansen and Jimeno (2007), we consider the unemployment insurance replacement ratio of (60%). On the other hand, we estimate the coverage rate separately for natives, new and incumbent immigrants, obtaining 40,8% for natives and incumbent

immigrants and 20,8% for new immigrants.[7] Thus, the flow utility of being unemployed is set at 24,5% of wages for natives and incumbent immigrants ($\tau_n = \tau_i = 0,245$) and 12,5% for new immigrants ($\tau_e = 0,125$).The workers bargaining power (β) is one half.

Figure 4.1: **Entry Rate of Immigrants Relative to Natives**

Percentage



Source: Own elaboration from INE data.

Regard to the assimilation process of new immigrants, the parameter ι is calculated as the inverse of the number of periods that a new immigrant delays their assimilation. From Fernandez and Ortega-Masague (2006) we set that in five years the assimilation costs of new immigrants in terms of labour productivity and job searching costs disappear. To express this parameter in quarters we have to divide by four. Then our ι is equal to $1/(5*4) = 0,05$.

The literature document that the return migration is high during the first years of residence in the host country. In particular, the paper of **??** report 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 γ_e and γ_i to 0,011 and 0,0025 respectively.

Regarding the parameters associated to assimilation costs of new immigrants, we set

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

productivity gap (ξ) and the searching costs parameter (ϕ_e) to match the average wage differential between immigrant and native workers. The wage for the different groups from the population were obtained from the 2005 Life Conditions Survey.[8] Concretely, we obtain that the foreign born wages are 20.7% lower than the same for natives. Then we set $\xi = 0.20$ and $\phi_e = 1.25\phi_n$.[9] In other words, new immigrants productivity is 20% lower and job searching costs are 25% higher with respect to native workers.

To close the calibration, the elasticity of the job search costs function ω and the search cost parameter for natives and assimilated immigrants $\phi_n = \phi_i$ are set to match our two targets during the immigration boom. Thus, $\omega = 1,7$ and $\phi_n = 100$. All the parameters are summarized in Table 4.1.

To capture the dynamic of immigration, we obtain the entry rate of immigrants (μ) to the Spanish labor market from data. Specifically, we approximate μ trough the change in the number of immigrant's working age population relative to the number of natives. Figure 4.1 shows the evolution of this variable from first quarter of 2002 until the fourth of 2006. As we mentioned before, our objective is to simulate the effects of immigration boom (captured throughout μ) in the Spanish labor market behavior.

5 Simulation results

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

The first noteworthy result is that, in average, the model is able to reproduce the observed differences in the unemployment and job finding rates among these three groups of workers. In particular, the baseline simulation presents an unemployment gap of 4,0 percentage points between assimilated immigrants and natives, which is somewhat near to the observed value of 2,8 percentage points between 2002 and 2006. Similar result is observed in the job finding probability gap between new immigrants and natives, with simulated gap of 12,3 percentage

[8]The monetary benefit of 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).

[9]This result is confirmed by Simon, Sanroma and Ramos (2008) who find that the average wage of immigrants, from developing countries, is 29,2 percent lower than native's wages.

points versus 7,3 in the data. The model is also able to reproduce the similar job finding rates between natives and assimilated immigrants (0,307 and 0,303, respectively). However, the benchmark model overestimates the unemployment rate of new immigrants (0,238 above the actual 0.145).

The higher average job finding rate of immigrants with less than five years with respect to the natives one takes place because the former group of workers present a search intensity rate of 0.209, which is 40% percent higher than the job search intensity rate of natives (0.149). In contrast, assimilated immigrants search for jobs with the same intensity to that observed in natives.

The second result shows how the immigration boom is not able to explain the dynamic behavior observed in the Spanish labor market during the last five years. More in detail, the simulated unemployment and job finding rates remain almost unchanged despite of the observed growth in the relative number of immigrant to native workers. The magnitude of the effects of immigration on unemployment of natives is one of the key elements of the debate about immigration. Empirical evidence shows that the impact of immigration on overall employment is, in fact, small. Nevertheless, there is evidence that migration affects negatively the employment opportunities of those natives with similar characteristics to the immigrants, i.e. those who compete with the immigrants in the labor market.[10].

6 Sensitivity to changes in the parameters related to the immigration process

In this section we present the results of a sensitivity analysis with respect to the main parameters related to immigration process. First, we eliminate the return migration rate for both, new and incumbent immigrants (γ_e and γ_i), and then equalize their job separation rates (ρ_e and ρ_i) to the natives one (ρ_n). Second, we eliminates the country assimilation costs in terms of productivity ξ and search efficiency ϕ_e. Third, we increase the immigration assimilation rate ι. Finally, the new immigrants replacement ratio with respect to unemployment insurance τ_e is set equal to the natives one τ_i.

As before, we reproduce the immigration boom trough the observed change in the number

[10]For a discussion on this topic see Borjas (2003) and Card (2005)

of immigrant's working age population relative to the number of natives (μ). 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 not significant sensitivity of unemployment and job finding probabilities to changes in the return migration rates (γ_e and γ_i), as well as in the country assimilation costs in terms of productivity ξ.

In turn, the presence of higher job searching costs in new immigrants reduce their job search intensity and, therefore, their job finding rate. More in detail, when these costs are increased by 25%, the job search intensity decreases by 15%, from 0,240 to 0,209, while their job finding rate decreases from 0,496 to 0,430. 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 searching costs (due to the limited knowledge of the local labour market institutions (Chiswick (1982)) or the presence of smaller social networks (Beggs and Chapman (1990))), present higher job finding probability than natives in Spain?

An answer to this question is the following: new immigrants search for jobs with higher intensity because they have lower coverage unemployment rate than natives. Notice that when the coverage rate of this group of workers increase from 0,125 to 0,245, their job search intensity rate decreases from 0,430 to 0,255. Associated whit this idea, it is well know that new immigrants show higher participation rate in the labor market and lower requirements to accept jobs.

The sensitivity analysis also shows that the unemployment rate for old immigrants is higher than the unemployment rate of natives only due to the presence of a higher job separation rate. More in detail, if the job separation rate of assimilated immigrants were equal to that observed in natives, then the unemployment rate of this group of workers would be even lower (0,088 with respect to 0,099, respectively)

Finally, the higher the assimilation rate (ι), the higher is the unemployment rate of new immigrants $u_{e_r} = \frac{u_e}{I_e}$. To understand this result, notice that to become an assimilated worker a new immigrant needs to find a job first. Thus, given the number of new unemployed immigrants (u_e), a higher job assimilation rate (ι) reduces the labour force of this group of workers (I_e) since a higher number of new employed workers become assimilated. Thus, the ratio of u_e to I_e is increased.

7 Final Comments

In this paper we evaluate the performance of natives and immigrants on Spanish labour market from 2002 to 2006 using the flows approach developed by Shimer (2007). We have found that the immigrant's job finding probability, and their variability, are grater than the natives ones. Moreover, the employment exit probability is also higher for immigrants than natives. The increment observed in the job finding probability and the unchanged value in the job separation probability suggest that the former is the key variable to understand the decline in unemployment rate observed during the period.

Regard to the assimilation process we found that job finding probabilities of natives and old immigrants are, on average, similar. Then the high job finding probability of immigrants is explained by the higher new immigrants job finding probability. New immigrants also show higher destruction rates than natives. These findings support the hypothesis assimilation process in terms of unemployment recently reported by Fernandez and Ortega-Masague (2006) and Amuedo-Dorantes and de la Rica (2007).

Finally, we develop and calibrate a search and matching with three different agents (natives, new and old immigrants) and a positive return migration probability. Our model is able to reproduce some of the observed differences in unemployment rates and, in particular, in the probability to find a job among different agents. However, the model can not reproduce the decline in unemployment rates. We carried out a sensitivity analysis and the results show coherency and robustness.

References

Abowd, John M. and Francis Kramarz, "The costs of hiring and separations," *Labour Economics*, October 2003, *10* (5), 499–530.

Amuedo-Dorantes, Catalina and Sara de la Rica, "Labour Market Assimilation of Recent Immigrants in Spain," *British Journal of Industrial Relations*, 06 2007, *45* (2), 257–284.

Beggs, John J and Bruce J Chapman, "Search Efficiency, Skill Transferability and Immigrant Relative Unemployment Rates in Australia," *Applied Economics*, February 1990, *22* (2), 249–60.

Borjas, George J, "Assimilation, Changes in Cohort Quality, and the Earnings of Immigrants," *Journal of Labor Economics*, October 1985, *3* (4), 463–89.

Borjas, George J., "The Labor Demand Curve Is Downward Sloping: Reexamining The Impact Of Immigration On The Labor Market," *The Quarterly Journal of Economics*, November 2003, *118* (4), 1335–1374.

Borjas, George J and Bernt Bratsberg, "Who Leaves? The Outmigration of the Foreign-Born," *The Review of Economics and Statistics*, February 1996, *78* (1), 165–76.

Card, David, "Is the New Immigration Really so Bad?," *Economic Journal*, November 2005, *115* (507), F300–F323.

Castillo, Sonsoles, Juan F. Jimeno, and Omar Licandro, "Employment segmentation, labour mobility and Mismatch: Spain, 1987-1993," Working Papers 98-04, FEDEA undated.

Chiswick, Barry R, "The Effect of Americanization on the Earnings of Foreign-born Men," *Journal of Political Economy*, October 1978, *86* (5), 897–921.

___ , *The Employment of Immigrants in United States*, Washington D.C.: American Enterprise Institute, 1982.

Dolado, Juan J., Marcel Jansen, and Juan F. Jimeno, "A Positive Analysis of Targeted Employment Protection Legislation," IZA Discussion Papers 2679, Institute for the Study of Labor (IZA) March 2007.

Dustmann, Christian and Yoram Weiss, "Return Migration: Theory and Empirical Evidence from the UK," *British Journal of Industrial Relations*, 06 2007, *45* (2), 236–256.

Fernandez, Cristina and Ana Carolina Ortega-Masague, "Labor Market Assimilation of Immigrants in Spain: Employment at the Expense of Bad Job-Matches?," Working Papers 2006-21, FEDEA 2006.

Levy, Horacio and Magda Mercader-Prats, "EUROMOD Country Report SPAIN," Technical Report, ESRC Research Centre on Micro-social Change 2003.

Lumpe, Christian and Benjamin Weigert, "Immigration Policy, Equilibrium Unemployment, and Underinvestment in Human Capital," 2007.

OECD, *International Migration Outlook*, Paris: OECD, 2007.

Pissarides, Christopher A, *Equilibrium Unemployment Theory*, 2 ed., MIT Press, 2000.

Shimer, Robert, "Reassessing the Ins and Outs of Unemployment," NBER Working Papers 13421, National Bureau of Economic Research, Inc September 2007.

Simon, Hipolito, Esteban Sanroma, and Raul Ramos, "Labour egregation and immigrant and native-born wage distribution in Spain: an analysis using matches employer-employee data," *Spanish Economic Review*, 2008, *forthcoming.*

Warren, Robert and Jennifer.M. Peck, "Foreign-Born emigration from the United States," *Demography*, 1980, *17*, 71–84.

Table 2.1: **Descriptive Statistics**

Average 2002-2006.

	Spaniards			**Immigrants**		
Level of education by age						
	Primary	Secondary	University	Primary	Secondary	University
Average	49,18	20,20	30,62	44,61	32,49	22,90
16-34	41,37	22,81	35,82	45,86	35,05	19,09
35-54	51,10	20,20	28,70	43,15	30,07	26,78
+54	69,92	10,50	19,58	43,37	22,31	34,32
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	
Years	39,63	39,52		34,57	34,76	
Labor Market						
	Act. rate	Unemp. rate	Emp. rate	Act. rate	Unemp. rate	Emp. rate
Percentage	54,65	9,97	49,21	76,73	13,63	66,60
	Temporary			Temporary		
Percentage	29,75			58,15		

Source: Own elaboration from INE data.

Table 2.2: **Unemployment rate by year since immigration**

Average year

Unemployment rate						
Years since immigration	Zero	One	Two	Three	Four	More than five
Average (Percentage)	25,51	16,81	13,51	10,83	10,87	12,78
	All immigrants	New immigrants	Old immigrants			
Average (Percentage)	13,63	14,53	12,78			

Source: Own elaboration from INE data.

Table 2.3: **Job-Finding and Employment Exit Probabilities**

Average 2002-2006. In percentage.

Job-Finding Probability						Employment Exit Probability					
Natives			Immigrants			Natives			Immigrants		
All Nat.			**All Imm.**			**All Nat.**			**All Imm.**		
0,306			0,347			0,032			0,061		
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	0,052	0,020	0,011	0,077	0,017	0,006
L-skill	**H-skill**		**L-skill**	**H-skill**		**L-skill**	**H-skill**		**L-skill**	**H-skill**	
0,306	0,311		0,350	0,343		0,036	0,023		0,065	0,051	
Const.	**Serv.**	**Others**	**Const.**	**Serv.**	**Others**	**Const.**	**Serv.**	**Others**	**Const.**	**Serv.**	**Others**
0,408	0,345	0,360	0,494	0,401	0,440	0,412	0,346	0,380	0,033	0,023	0,029
Women	**Men**		**Women**	**Men**		**Women**	**Men**		**Women**	**Men**	
0,301	0,339		0,301	0,402		0,047	0,025		0,070	0,054	

Source: Own elaboration from INE data.

Table 2.4: **Summary Statistics**

Annual Average 2002-2006

	Job Finding Probability			**Employment Exit Probability**		
	Spaniards	New Immigrants	Incumbents	Spaniards	New Immigrants	Incumbents
2002	0,232	0,236	0,188	0,030	0,077	0,054
2003	0,241	0,336	0,232	0,030	0,068	0,044
2004	0,292	0,357	0,172	0,031	0,062	0,054
2005	0,383	0,517	0,459	0,034	0,073	0,061
2006	0,375	0,446	0,405	0,033	0,075	0,059

Source: Own elaboration from INE data.

Table 4.1: Baseline parameters

Natives									
δ_n	p	c	α	ρ_n	r	β	τ_n	ω	ϕ_n
0,004	1	0,12	0,85	0,03	0,012	0,50	0,245	1,7	100

Immigrants									
	μ	ι	γ_e	γ_i	ϕ_e	ϕ_i	ξ	ρ_e	ρ_i
	Figure 4.1	0,05	0,011	0,0025	125	100	0,20	0,07	0,05

Source: Own elaboration from INE data.

Table 5.1: **Data and Simulated results**

Annual Average 2002-2006

Data									
	u_n	$\frac{u_e}{I_e}$	$\frac{u_i}{I_i}$	f_n	f_e	f_i	s_n	s_e	s_i
2002	0,113	0,159	0,140	0,232	0,236	0,188	n,a	n,a	n,a
2003	0,111	0,169	0,145	0,241	0,336	0,232	n,a	n,a	n,a
2004	0,106	0,141	0,140	0,292	0,357	0,172	n,a	n,a	n,a
2005	0,088	0,125	0,106	0,383	0,517	0,459	n,a	n,a	n,a
2006	0,080	0,133	0,108	0,375	0,446	0,405	n,a	n,a	n,a
Average	0,100	0,145	0,128	0,305	0,378	0,291	n.a	n.a	n.a

Simulated results									
	u_n	$\frac{u_e}{I_e}$	$\frac{u_i}{I_i}$	f_n	f_e	f_i	s_n	s_e	s_i
2002	0,100	0,239	0,140	0,306	0,429	0,302	0,149	0,209	0,147
2003	0,099	0,238	0,139	0,307	0,431	0,304	0,149	0,209	0,147
2004	0,099	0,238	0,139	0,307	0,431	0,304	0,149	0,209	0,147
2005	0,099	0,238	0,139	0,307	0,431	0,304	0,149	0,209	0,147
2006	0,099	0,238	0,139	0,307	0,431	0,304	0,149	0,209	0,147
Average	0,099	0,238	0,139	0,307	0,430	0,303	0,149	0,209	0,147

Table 6.1: **Simulated results for the sensitivity analysis**

Annual 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
$\gamma_e = \gamma_i = 0$	0,100	0,219	0,140	0,304	0,444	0,304	0,149	0,216	0,149
$\rho_e = \rho_i = \rho_n = 0,03$	0,099	**0,179**	**0,088**	0,309	0,434	0,305	0,149	0,209	0,147
$\xi = 0$	0,099	0,237	0,139	0,307	0,432	0,304	0,149	0,209	0,147
$\phi_e = \phi_i = \phi_n = 100$	0,100	0,213	0,139	0,307	**0,496**	0,303	0,149	**0,240**	0,147
$\tau_e = \tau_i = \tau_n = 0,245$	0,099	**0,347**	0,139	0,307	**0,255**	0,303	0,149	**0,122**	0,147
$\iota = 0,1255$	0,100	**0,328**	0,139	0,305	0,429	0,302	0,149	0,209	0,147
Benchmark economy	0,099	0,238	0,139	0,307	0,430	0,303	0,149	0,209	0,147