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Crisis, Immigration and Job Loss

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Abstract
The profound crisis that is affecting the Spanish economy has been characterized by significant job losses, and the resulting increase in the unemployment rate. Although unemployment has affected all population groups, there are differences across them in the intensity of its impact. Compared to natives, immigrant workers were the first and hardest hit by job losses. In this context, this paper studies the differences between immigrants and natives in the probability of job loss in a period of deep economic crisis. To do this, we apply a methodology to decompose the difference between natives and immigrants in the propensity to lose their jobs in, on the one hand, the differences in the individual, job, and firm observable characteristics and, on the other, in the differences in the impact of these characteristics. To ensure the robustness of the results we use a decomposition based on a probabilistic model that controls for likely differences between natives and immigrants in the probability of participation in the labour market. The results show that the observable characteristics do not explain all the differences between natives and immigrants in the probability of job loss in a period of crisis and, therefore, point to some discrimination against the latter. However, in the particular case of immigrants from countries of the European Neighbourhood Policy this seems not to be the case, since the lower endowment of education, and the particular occupational and sectoral distribution of this group explains almost completely its higher rate of job loss.

Keywords
Immigration, labour market segregation, nonlinear decomposition, ENP

JEL classification
C25, J61, J64, J70

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1. INTRODUCTION

The Spanish economy experienced an intense flow of immigration throughout the period of economic expansion since the mid-90's to the early effects of the current crisis in the second half of 2008. The magnitude and impact of the phenomenon sparked social and academic interest, especially in relation to the impact on the labour market.

A simple observation of the aggregate data available reveals how Spain in a few years reached immigration levels than other countries, with more experience in this type of processes, took decades to achieve. In about fifteen years the immigrant population in Spain grew from just over 2% in 1996 to reach 14% in 2009. And virtually all of this increase resulted from the large influx of what is known as economic immigrants, largely from developing countries. Such immigrants represented in the time immediately prior to the current crisis about 80% of all foreigners in Spain. It should be mentioned that the group of immigrants from countries of the European Neighbourhood Policy (ENP)[1] is the second most abundant, after that of Latin American countries with which Spain shares linguistic and historical ties. Among the ENP countries (ENC), was particularly intense immigration from North Africa, especially from Morocco.

The sudden and intense immigration boom in Spain has motivated several studies that have attempted to determine its effect on labour market issues, including the impact on wages, working conditions, segmentation, and return to schooling. Given the connection to our goal in this paper we want to highlight those referring to the process of the labour market assimilation of immigrants. Overall, the evidence suggests some assimilation in terms of employment and unemployment among natives and immigrants after a certain period of residence, which could be about five years (Amuedo-Dorantes and De la Rica, 2007; Fernández and Ortega, 2008; Silva and Vázquez-Grenno, 2011). However, these studies, like those who have addressed other issues relating to the impact of recent migration on the Spanish labour market, agree as to the consideration of the phenomenon under study only during the expansion of the Spanish economy. Obviously

[1] The ENP was developed in 2004, with the objective of avoiding the emergence of new dividing lines between the enlarged EU and its neighbours and instead strengthening the prosperity, stability and security of all. This is proposed to ENP framework of the EU's 16 closest neighbours - Algeria, Armenia, Azerbaijan, Belarus, Egypt, Georgia, Israel, Jordan, Lebanon, Libya, Moldova, Morocco, Occupied Palestinian Territory, Syria, Tunisia and Ukraine.

this can be explained by the scarcity of immigration in Spain in previous economic downturns.

In any case, the impact of the current crisis in the Spanish economy, which began in late 2008, is an ideal scenario for assessing the response in terms of employment of migrant workers and, especially, for comparison with the impact of the crisis on employment of native workers. A simple inspection of aggregated data provided by the Labour Force Survey (LFS) shows that job losses since the start of the crisis has not occurred evenly to all groups of workers. Specifically, the employment figures show that immigrants have been clearly more affected than natives. It is this difference in the rate of job loss between natives and immigrants in the period of crisis that motivates our analysis in this paper.

In a nutshell, the question we ask ourselves is whether the pattern of assimilation observed along the growth period remained after the impact of the crisis. And therefore, if a native and an immigrant worker with similar characteristics showed the same chances to maintain or lose their jobs or if, on the contrary, immigrants suffered further the impact of the crisis on the labour market. One would expect that job losses were greater for immigrants if they were less productive due to, for example, a lower endowment of human capital, and/or because they were employed in activities more sensitive to the business cycle. But it may be that for individuals endowed with similar characteristics and working in similar jobs and firms, the rate of job loss was greater for immigrants than for natives. In that case, the evidence would suggest that given the need to reduce their workforce as a result of the recession, companies fired first immigrant workers simply because of their status as foreigners, implying a form of discrimination against this group. It would be a sort of *"last in - first out"* decision process.

Moreover, our study analyses whether there are differences depending on the origin of immigrants, distinguishing between those from the countries of the ENP and the rest. This distinction is relevant to the assessment of labour migration from ENC to an EU country, since it complements the evidence from other studies whose focus is on wage

differentials between EU natives and immigrants from ENC, or those studying the role played by remittances to these countries by their emigrants.[2]

The empirical analysis in this paper exploits the information contained on micro-data from the LFS in the early years of the current economic crisis, when its impact on job losses was more sudden and of virulent intensity. The difference in the probability of job loss between immigrants and natives is decomposed into two components. A first one corresponding to the contribution of differences in the observable characteristics of native and immigrant workers and, a second one, to differences in the impact of these characteristics on the probability of job loss. To do so we apply a decomposition method designed for the case of a probabilistic model such as the one specified to model the probability of job loss. It should be mentioned that the method also takes into account the likely differences between immigrants and natives in the probability of participating in the labour market (providing robust results even under sample selection).

The rest of the paper is organized as follows. Section 2 presents the database and the procedure used to construct the main variable under analysis, that is if each worker in the sample maintained or lost job, which allow us to compute the rate of job loss for natives and immigrants. The description of the job loss rate for these two groups of individuals as well as the comparison of their observable characteristics is presented in section 3. Then, section 4 describes the specifications used for estimating the impact of the characteristics on the probability of job loss for natives and immigrants, and the method for decomposing the native-immigrant gap in this probability. The corresponding results are discussed in section 5 for the entire group of immigrants, while section 6 gives especial attention to those corresponding to immigrants from ENC. Finally, section 7 concludes.

2. DATABASE

In this study we used the data included in the Spanish wave of the LFS during the period between the first quarter of 2008 and the first quarter of 2009. We selected this

[2] See Wesselink and Boschma (2011) for a review the literature on the impact of labour migration in the context of the ENP.

period with the aim of comparing the probabilities of job loss just before the impact of the crisis in the Spanish labour market, in mid-2008, and when it started to exert a strong effect, from the last quarter of 2008. The LFS, produced by the Spanish National Office for Statistics (INE), provides information on the personal characteristics of individuals as well as of the jobs and firms where they were employed. In addition, the LFS includes information that allows identifying immigrants by country of origin (and thus select those from developing countries and the ENC), irrespective of their legal status in Spain. This means that the sample we used in this study potentially represents both immigrants with legal status, and those in irregular legal situation. Thus, despite the limitations of this database in measuring the immigrant population (likely underestimating the number of immigrants) is probably the most appropriate one for the type of analysis we intended to do.[3]

The sample includes individuals aging between 16 and 60 years, in the Spanish territory with the exception of Ceuta and Melilla (two Spanish city regions in North Africa), whose main occupation was not military, business management, or public administration, and who did not have dual nationality.[4, 5] Since our focus in this paper is on immigrants from developing countries, those foreign nationals from North America, Oceania and other states members of the EU-15 were excluded from the sample.

The object of study in this work lies in the probability that individuals in the sample had of losing or maintaining their jobs for a given quarter at the start of the crisis. This requires building job transitions (from employment to a different status in the labour market) by linking the information contained in the responses of individuals to some of the questions in the LFS questionnaire.[6] The process begins by taking as reference a given quarter of the LFS (quarter *t*), and classify individuals as employed or not. An

[3] See Pérez-Infante (2006) for further details of the limitations of the EPA regarding the immigrant population.
[4] The sample was restricted to individuals aging less than 60 years to homogenize the groups, as the immigrant population older than this age was still limited in the period analysed.
[5] Given their particularities, these occupations have been excluded from the analysis to guarantee consistency.
[6] An alternative would have been to use the continuous LFS. However, this database has two major drawbacks for the type of analysis that interests us. First, it does not identify the group of immigrants from developing countries, as it only provides information on whether the individual is a Spanish or foreign. The second problem stems from the statistical significance, because as its sample is much smaller, the number of immigrants included in various quarters is very limited.

individual would have kept her job during the quarter if being employed at *t* declares seniority higher than three months. By contrast, an individual would have lost her job during the quarter if not being occupied at *t,* the time since her last job indicates that the job loss took place not later than the previous quarter. To be included in the category of individuals that lost job, the individual has to meet two requirements: i) to have been a wage earner, and ii) not have stopped the job voluntarily.[7] We therefore consider that lost their jobs only those individuals who were employed in quarter t-1 but not in quarter t, either because they were unemployed, affected by an employment regulation order (the so-called ERE), or looking for a job but did not meet some of the conditions to be officially classified as unemployed.

As a result of the process, we define a binary variable, *job-loss*, which is equal to 1 if the individual lost his job during the quarter, moving from being employed at time *t-1* to not occupied at time *t,* and 0 otherwise, i.e. when the individual was employed in period *t-1* and period *t.*[8]

3. DESCRIPTIVE ANALYSIS

The analysis of the variable *job-loss,* which as mentioned above indicates if a wage earner maintained or lost employment in a given quarter, shows that 4.8% of all the employees in Spain lost their jobs in the first quarter of 2008 (Figure 1). It can also be observed that the rate of job loss increased over the period under analysis up to 7.2% in the first quarter of 2009. That is, the rate of job loss almost doubled in just one year. Beside the rate corresponding to the entire working population, Figure 1 shows the rate of job loss for natives and immigrants, confirming our hypothesis regarding the existence of substantial differences in the rate between these two groups. The rate of job loss for both groups was increasing as the recession deepened, but the impact was considerably higher for immigrant workers. As a result, the gap between immigrants and natives in the rate grew. In the first quarter of 2008, 4.3% of the natives lost the job whereas the rate was at 10% for immigrants (a gap lower than 6 percentage points –pp.).

[7] Our study aims to analyse whether reducing the workforce, employers chose to delete first jobs filled by immigrant workers. Therefore, the self-employed and voluntary layoffs fall outside the category of workers who lost their jobs.

[8] It should be noticed that individuals who changed job within the quarter are classified as not job-losers, because our focus is on the chance of moving from having a job to having no job.

After the initial impact of the crisis, in the first quarter of 2009, the rate for immigrants was nearly ten points higher than that of natives (16% vis-á-vis 6%). Therefore, using the rate of job loss as a proxy of the average probability of losing the job for any individual in the sample, we believe that the gap between immigrants and natives is large enough to motivate its detailed analysis in this paper.

Once the data from the LFS has confirmed the extent of the gap in the rate of job loss between natives and immigrants, the next step is to analyse the reasons behind the different impact of the crisis on the chances of losing the job for immigrant and natives. More precisely, we want to check if the gap can be simply explained by differences between natives and immigrants in the endowment of observable personal, job, and firm characteristics, or if differences in the effects of these characteristics between the two groups play also a role when explaining the gap in the probability of losing job. A significant contribution of the latter would mean that at least part of the gap responds to a sort of discriminatory treatment against the immigrants. This is because in such a case a migrant worker would have been more likely to have lost job in the initial period of the crisis in relation to a native worker with similar personal characteristics and occupied in the same type of job and firm.

As a first stage of the study, in the rest of this section we provide a descriptive analysis that allows comparing the endowment of the observable characteristics for immigrants and native workers. Results in Table 1 show how different are the individuals in each group as regards their personal, job, and firm observable characteristics in each quarter under analysis.[9] A priori one would expect that immigrants had been endowed with characteristics that made them more prone to loss of employment, such as lower human capital and a greater presence in industries most sensitive to the crisis, especially construction. The information contained in Table 1 confirms this suspicion. It can be observed that while the gender distribution is very similar between natives and immigrants, the latter have lower endowment of human capital. First, the average age for immigrants is lower than that for natives which, assuming the usual relationship between age and general experience in the labour market, means that they have less work experience. While about 50% of the natives have over 40 years or more, only 30%

[9] To save space, we only include results for the first and third quarters of 2008 and the first of 2009. Results for the other quarters are available upon request.

of immigrants exceeded that age. Second, educational attainment for immigrants is also lower than the one for natives, in around a year. Given the connection between these two measures of human capital and labour productivity, one would expect that when a firm had to reduce its workforce, the less productive workers were the first to be fired, so that immigrants would have fewer options to maintain their jobs because of lower human capital.

Beside the differences in the observed personal characteristics, immigrants and natives also differed in the characteristics of the jobs and firms where they were employed. Table 1 shows how migrant workers were more represented than natives in the construction, retail and hospitality, and agriculture. These were precisely the sectors that accumulated higher numbers of job losses in the early stages of the current crisis. Nonetheless, figures in Table 1 reveal that the difference in the occupational distribution is even more intense than sectorial segregation. The data shows how the distribution of occupations for natives and immigrants is very uneven. About 60% of the immigrants were in unskilled occupations (40%) and retail and catering (20%), while in the case of natives the percentage in these occupations was limited to 30%. In turn, about 30% of the natives were employed in skilled technical and professional occupations, while those occupations among immigrants only accounted for 5%.

Finally, it is worthwhile to highlight the geographic distribution of immigrants, as they tended to be concentrated in certain regions, which made that there was no correspondence with the spatial distribution of natives. As shown in Table 1, immigrants were concentrated in economically dynamic regions, such as Aragon, Balearic Islands, Catalonia, Valencia and Madrid. By contrast, the presence was lower in traditionally less economically advanced regions like Andalusia, Extremadura, Castile-Leon and Galicia. Regional differences in the initial impact of the crisis, and the above-mentioned features of the spatial distribution of immigration, could also explain some of the differences in the probability of job loss between natives and immigrants.

Summing up, a simple comparison of the description of the characteristics of immigrants and natives in the sample confirms that substantial differences between the two groups existed. Actually, figures indicate that immigrants possessed personal characteristics and were employed in occupations and firms that were more sensitive to

the loss of employment when the crisis began to strike with force to the Spanish economy. However, this comparison does not allow us to say that the entire difference in the rate of loss of employment between immigrants and natives (and therefore on the individual probability of job loss between the two groups) can be attributed to differences in the endowment of the observable characteristics.

In fact, another simple analysis provides evidence that it may not have been the case. Table 2 shows the rate of job loss for each of the categories of the main characteristics observed in immigrants and natives. The fact that the rate was higher for immigrants within all categories suggests that the difference between both groups of workers could not be due only to differences in the distribution of personal, job, and firm characteristics. Nevertheless, it is obvious that the difference between natives and immigrants could be caused simultaneously by several characteristics, so we should consider them all together. That is, conditioning on all observable characteristics simultaneously.

In the next sections we present the methodology to perform this type of analysis, and the results of its application to the present case in this work. The decomposition of the difference in the probability of job loss between natives and immigrants will determine how much of this discrepancy is attributable to differences in observable characteristics of natives and immigrants. The remainder can then be attributed to possible discrimination against immigrants in the dismissal decisions in the crisis period.

4. METHODOLOGY

This section describes the methodology used to analyse in detail the difference in the probability of job loss between natives and immigrants. To do this, first, we present the specification used to approximate the probability of job loss for natives (the group that we assume suffers no discrimination) and for immigrants (the discriminated group).[10]

[10] The model is specified for the probability of job loss for convenience in interpreting the results of both the probabilistic model and the decomposition of the gap between natives and immigrants. Symmetric results are obtained when the likelihood of maintaining employment is the event being analysed.

Then, we describe the procedure used to decompose the gap in this probability between the two groups.

4.1. Empirical model

We start from the latent variable $emp*$ which captures the individual's propensity to be employed:

$$emp* = Z\gamma + \mu, \qquad \mu \sim N(0,1) \tag{1}$$

where Z represents a set of observable characteristics, γ is the coefficient vector, and μ the error term that is distributed as a standard normal. The result of the process in equation (1), $emp*$, is unobservable in practice. We can only observe whether the individual was or was not employed. Thus, we define the indicator emp that takes value 1 if the latent variable is positive, and 0 otherwise:

$$emp = 1(emp* > 0) = 1(Z\gamma + \mu > 0) \tag{2}$$

$$emp = 0(emp* \leq 0) = 0(Z\gamma + \mu \leq 0) \tag{3}$$

In turn, those who were employed ($emp* > 0$) were able to keep their jobs or to lose them during the corresponding quarter. So we define $job-loss*$ as a latent unobservable variable for the individual's probability of job loss by:

$$job-loss* = X\beta + \varepsilon, \qquad \varepsilon \sim N(0,1) \tag{4}$$

where X contains the set of observable characteristics related to the likelihood of an individual to lose or to maintain employment, β is the parameter vector that captures the effect of these variables and ε is the error term with standard normal distribution. Although $job-loss*$ is not observable, we can use the indicator *job-loss*, described in section 2, to know if each individual in the sample kept her job during the corresponding quarter or, conversely, if she lost it. Therefore, the link between *job-loss** and *job-loss* is given by:

$$job-loss = 1(job-loss* > 0) = 1(X\beta + \varepsilon > 0) \tag{5}$$

$$job-loss = 0(job-loss* \leq 0) = 0(X\beta + \varepsilon \leq 0) \tag{6}$$

Assuming $corr(\mu,\varepsilon)=0$, a consistent estimate of the parameters of the process associated with the probability of job loss in (4) can be obtained through a univariate probit model for the event of job loss versus maintaining it, using the set of observable characteristics of workers, the workplaces and firms:

$$prob(job-loss=1)=\Phi_u(X\beta) \tag{7}$$

where $prob(job-loss=1)$ represents the probability of job loss, and Φ_u denotes the cumulative distribution function of the univariate standard normal.

But in the case where $corr(\mu,\varepsilon)=\rho\neq 0$, then $(\mu,\varepsilon)\sim N_b(0,0,1,1,\rho)$, so that estimates based on (7) will not guarantee the consistency of the estimation of the parameters of interest. The correlation between the error terms might be caused by unobservable factors (e.g. innate ability of individuals) that simultaneously affect the probability of being employed and the probability of job loss. A consistent estimate of the coefficients in such a framework can be obtained by estimating the so-called Heckman Probit model by maximum likelihood.[11]

Since we observe if the individual lost or kept the job only for those that were employed, the scenario of our analysis is one of sample selection, in which individuals in the sample faced three alternative situations: i) the individual was not employed, ii) the individual was employed and kept the job and, iii) the individual was employed but lost job during the quarter.

Therefore the joint probability of being employed and job loss is:

$$prob(emp=1,job-loss=1)=\Phi_b(X\beta,Z\gamma,\rho) \tag{8}$$

where Φ_b is the cumulative distribution function of the bivariate normal. The matrix of characteristics Z may contain any or all variables in X, though to prevent the

[11] See for instance, Cameron and Trivedi (2005). We used the *heckprob* command in Stata to obtain the estimates.

identification for estimating the parameters based solely on the nonlinearity of the functional form, it is required that at least one of the variables included in *Z,* which determines the probability of being employed, is excluded from X, which means that it is assumed not to exert a direct effect on the probability of job loss.

The probability of loss of employment conditional on being employed is obtained through the joint probability of being employed and job loss, and the probability of being employed, as:

$$prob\left(job-loss=1 \mid emp=1\right)=\frac{prob\left(emp=1, job-loss=1\right)}{prob(emp=1)}=\frac{\Phi_b(X\beta, Z\gamma, \rho)}{\Phi_u\left(Z\gamma\right)} \quad (9)$$

In addition, the impact of the characteristics on the unconditional probability of job loss can be obtained using the estimated parameters in the sample selection specification, $\hat{\beta}$, from:

$$prob\left(job-loss=1\right)=\Phi_u\left(X\hat{\beta}\right) \quad (10)$$

The impact of the characteristics on the conditional probability is informative on their effect on the probability of job loss for the employed, while that on the unconditional probability allow us to make an assessment of the effects for the entire population, regardless of whether they were employed or not. This is an important distinction because there may be effects on the probability of losing or maintaining job that wholly or partly manifested through its influence on the likelihood that an individual was employed.

4.2. Decomposition of the gap in the probability of job loss

We apply the generalization of the traditional decomposition of Oaxaca-Blinder (Oaxaca, 1973; Blinder, 1973) proposed in Yun (2004) to quantify the contribution of differences in observable characteristics and those that can not be attributed to them, to the native-immigrant gap in the probability of job loss. The generalized method proposed by Yun provides a valid methodology for nonlinear functional forms having as argument a linear combination of variables.

In the case of the unconditional probability from the probit model specified in (7), the decomposition based on a consistent estimate of the parameters, can be written as:

$$\begin{aligned}\overline{prob(job-loss)_N} - \overline{prob(job-loss)_I} = &\left[\overline{\Phi_u\left(X_N\hat{\beta}_N\right)} - \overline{\Phi_u\left(X_I\hat{\beta}_N\right)}\right] \\ &+\left[\overline{\Phi_u\left(X_I\hat{\beta}_N\right)} - \overline{\Phi_u\left(X_I\hat{\beta}_I\right)}\right]\end{aligned} \tag{11}$$

The term on the left of equation (11), $\overline{prob(job-loss)_N} - \overline{prob(job-loss)_I}$, corresponds to the gap between natives (*N*) and immigrants (*I*) in the average unconditional probability of job loss. This difference can be decomposed into the sum of two terms. The first term of the right side of the equation, $\left[\overline{\Phi_u\left(X_N\hat{\beta}_N\right)} - \overline{\Phi_u\left(X_I\hat{\beta}_N\right)}\right]$, reflects the effect attributable to differences in the observable characteristics of natives and immigrants, while the second term, $\left[\overline{\Phi_u\left(X_I\hat{\beta}_N\right)} - \overline{\Phi_u\left(X_N\hat{\beta}_N\right)}\right]$, corresponds to the difference in the impact of the characteristics. The latter term is the one that may point to the existence of discrimination against immigrants, as indicates that immigrants with similar characteristics to those of the natives have different probability of job loss. In the absence discrimination, this term equals zero.[12]

The decomposition in (11) does not allow us to isolate the contribution of each characteristic or set of characteristics to the gap in the probability between natives and immigrants. To overcome this drawback, we follow the proposal in Yun (2004) and use:

$$\begin{aligned}&\overline{prob(job-loss)_N} - \overline{prob(job-loss)_I} = \\ &\sum_{i=1}^{k} P_{\Delta X}^{i}\left[\Phi_u\left(\bar{X}_N\hat{\beta}_N\right) - \Phi_u\left(\bar{X}_I\hat{\beta}_N\right)\right] + \sum_{i=1}^{k} P_{\Delta\beta}^{i}\left[\Phi_u\left(\bar{X}_I\hat{\beta}_N\right) - \Phi_u\left(\bar{X}_I\hat{\beta}_I\right)\right] = \\ &\sum_{i=1}^{k} P_{\Delta X}^{i}\left[\Phi_u\left(\left(\bar{X}_N - \bar{X}_I\right)\hat{\beta}_N\right)\right] + \sum_{i=1}^{k} P_{\Delta\beta}^{i}\left[\Phi_u\left(\bar{X}_I\left(\hat{\beta}_N - \hat{\beta}_I\right)\right)\right]\end{aligned} \tag{12}$$

[12] However, note that the omission of relevant characteristics for the probability of job loss in the empirical model would cause the second term would be different from zero, even in the absence of discrimination. Consequently, as is usual in this type of exercise, the results are contingent on the proper specification of the empirical model.

where: $$P_{\Delta X}^{i}=\frac{\left(\overline{X}_{N}^{i}-\overline{X}_{I}^{i}\right)\hat{\beta}_{N}^{i}}{\left(\overline{X}_{N}-\overline{X}_{I}\right)\hat{\beta}_{N}},\quad P_{\Delta X}^{i}=\frac{\overline{X}_{I}^{i}\left(\hat{\beta}_{N}^{i}-\hat{\beta}_{I}^{i}\right)}{\overline{X}_{I}\left(\hat{\beta}_{N}-\hat{\beta}_{I}\right)},\quad \sum_{i=1}^{k}P_{\Delta X}^{i}=\sum_{i=1}^{k}P_{\Delta\beta}^{i}=1$$

$P_{\Delta X}^{i}$ and $P_{\Delta\beta}^{i}$ denote, respectively, the weights that allow to distribute the total contribution of differences in the endowment, and in the impact, among each of the observable characteristics.

For the bivariate probit model with selection described above, the decomposition of the gap in the conditional probability is obtained from the expression for the probability in (9):

$$\overline{prob\left(job-loss=1\,|\,emp=1\right)}_{N}-\overline{prob\left(job-loss=1\,|\,emp=1\right)}_{I}=$$
$$\left[\overline{\frac{\Phi_{b}(X_{N}\hat{\beta}_{N},Z_{N}\hat{\gamma}_{N},\hat{\rho}_{N})}{\Phi_{u}\left(Z_{N}\hat{\gamma}_{N}\right)}}-\overline{\frac{\Phi_{b}(X_{I}\hat{\beta}_{N},Z_{I}\hat{\gamma}_{N},\hat{\rho}_{N})}{\Phi_{u}\left(Z_{I}\hat{\gamma}_{N}\right)}}\right]+\left[\overline{\frac{\Phi_{b}(X_{I}\hat{\beta}_{N},Z_{I}\hat{\gamma}_{N},\hat{\rho}_{N})}{\Phi_{u}\left(Z_{I}\hat{\gamma}_{N}\right)}}-\overline{\frac{\Phi_{b}(X_{I}\hat{\beta}_{I},Z_{I}\hat{\gamma}_{I},\hat{\rho}_{I})}{\Phi_{u}\left(Z_{I}\hat{\gamma}_{I}\right)}}\right]\quad (13)$$

where $\overline{\frac{\Phi_{b}(X_{I}\hat{\beta}_{N},Z_{I}\hat{\gamma}_{N},\hat{\rho}_{N})}{\Phi_{u}\left(Z_{I}\hat{\gamma}_{N}\right)}}$ denotes the sample mean of the counterfactual conditional probability for immigrants using the estimated coefficients ($\hat{\beta}_{N}$, $\hat{\gamma}_{N}$) and the estimate of the correlation ($\hat{\rho}_{N}$) of natives. The interpretation of the terms in (13) is similar to that made for the decomposition in (11). The comparison of the decomposition of the gap in this conditional probability with that based on the univariate probit model in (7) allows us to assess the robustness of the decomposition to the likely existence of sample selection.[13]

A final methodological issue we have to mention is on the treatment of the various dummy variables included in the model. The inclusion of categorical variables related to the characteristics of the individual, job, and firm makes difficult to quantify their effects on the decomposition. The usual estimation process, based on the exclusion of a category to avoid the so-called *dummy variable trap,* that normally poses no problem, represents a serious dysfunction in applying decomposition techniques required for the study of discrimination. In order to avoid this problem we have used the identification

[13] Note that in this case it is not possible to apply straightforwardly the detailed decomposition outlined above for the unconditional probability.

restriction proposed in Gardeazabal and Ugidos (2004) to estimate the coefficients to be used to compute the decomposition. This restriction allows to obtain estimates of the effects attributable to each category that are robust to the excluded category. Briefly, it consists in imposing the following restriction on the coefficients of the dummy variables for a given characteristic:

$$\sum_{j=1}^{J} \pi_j = 0 \tag{19}$$

where $j = 1, \ldots J$ are the J categories of the variable and π_j the parameter associated with category j.

5. RESULTS

5.1. Estimated impact of observable characteristics

This section summarises the results obtained in the estimation of the probability models described in section 4.1, considering as determinants of the probability of job loss a set of personal characteristics (nationality, gender, age and educational attainment), and household environment (marital status, living with spouse, number of household members, number of children, if there are children under 10 years, and region of residence), and characteristics of the job and the firm (occupation and sector). As indicated above, we also aim at accounting for observable and unobservable factors that affect the probability of job loss indirectly through their effect on the probability of being employed.

The results of the probit model with sample selection, defined in section 4.1, for all individuals in the sample –both immigrants and natives, and the various quarters of the period under analysis, are summarized in Table 3. First at all, it must be stressed the overall significance of the model and the reasonably good adjustment. It is observed as well the high level of significance of each of the parameters, and that the signs correspond to those expected a priori. Finally, it is worthwhile noting that the estimate of ρ is statistically significant, indicating that unobserved factors affecting the probability of being employed conditioned the probability of job loss, indeed confirming the need to control for sample selection.

As for the net impact associated with being an immigrant, the estimated marginal effect confirms that a migrant worker had higher probability of job loss than other native worker with similar characteristics. And the results for the different quarters indicate that the gap between them increased after the impact of the crisis. While in the first quarter of 2008, when the crisis had not seriously affected the Spanish economy, being an immigrant did increase the probability of job loss in 2.6pp, in the same quarter of 2009, the gap increased to 5pp.

With respect to other characteristics, the estimated marginal effects show that age and education decreased the likelihood of job loss. Meanwhile, men were less likely to lose job than women, while as expected, less skilled occupations faced a higher risk of job loss. As for the impact of the sector, the results confirm the evidence from aggregate statistics, which indicate that job loss was higher for workers in construction and agriculture. Finally, household characteristics appear to have had some effect only before the impact of the crisis, since the estimated coefficients for most of them are not statistically significant from the third quarter of 2008.

The results discussed above correspond to a specification that imposes the same impact of the observable characteristics on the probability of loss of employment for immigrants and natives. However, the existence of discrimination against immigrants would be manifested in an impact on the characteristics of immigrants differently than the natives, so that the probability of expected job losses for natives and immigrants with similar characteristics would differ. To assess such differences, Table 4 shows the marginal effects estimated from the probit model with selection for the subsamples of the immigrants and the natives.

The results show substantial differences between immigrants and natives in the impact of the observed characteristics. For example, while for the natives, men were less likely to job loss than women, both before and during the initial impact of the crisis, in the case of immigrants does not seem to be gender differences before crisis, while during the first stages of the crisis, women were less likely to job loss than men. There are also differences in the effect of age, as it is not relevant to explain the loss of employment among immigrants until the first quarter of 2009. As for the estimated impacts for education and occupation, they are significant for natives before and during the crisis,

while the estimated effects for immigrants are rather volatile over time. In any case, immigrant workers in skilled occupations do show consistently lower probability of job loss than immigrants in less skilled occupations. Finally, the sector's impact was considerably greater for immigrants, while cannot be deduced a clear pattern in the case of household characteristics.

These results suggest that differences between immigrants and natives in the rate of job loss could not have been caused solely by differences in observable characteristics. As noted in section 4.2, the decomposition of the gap between natives and immigrants in the probability of job loss will allow us to conclude on the contribution of, on the one hand, differences in the endowment of observable characteristics and, on the other, that corresponding to differences in their impact.

5.2. Decomposition of the gap in the probability of job loss

The estimate of the coefficients of the probit model with selection for natives and immigrants described above is used in this section for implementing the decomposition of the gap between the two groups in the probability of job loss. Table 5 summarizes the results obtained for the case of the conditional probability, i.e. for individuals actually employed. The first column shows the difference in the probability of job loss that, as noted in Section 2, rose steadily throughout the period analysed. In the first quarter of 2008 the gap was 5.7pp, while in the same quarter of 2009 reached almost 10pp. The figures in the second and third columns of results in Table 5 show that the differences between natives and immigrants in observable characteristics do not explain the entire gap, neither before the crisis nor even when it began to show its effects on the labour market. In fact, the portion attributable to differences in the impact is as high as the one of the endowments. Therefore, both contributed equally to the increase in the gap after the impact of the crisis.

Further to the above results based on the gap in the conditional probability, we have also decomposed the gap in the unconditional probability, as defined in section 4.2. The results are summarized in Table 6. In this case, the first column of results corresponds to the gap between natives and immigrants in the unconditional probability of job loss. As indicated above, this probability would be that of a randomly selected individual from the population (either the native or immigrant), regardless of her employment status

(employed or not) in the corresponding quarter. It can be observed how the gap in the unconditional probability differs from the one previously discussed for the conditional probability. While at the beginning of 2008, when the crisis had not affected yet the labour market, the gap in the unconditional probability was less than the difference in the conditional probability in just over 2 pp, after the impact of the crisis the situation is reversed, with a greater gap in the unconditional probability, over 3pp. In any case, the figures clearly show the substantial increase in the unconditional probability gap throughout the period under analysis (10pp from the first quarter of 2008 to the first of 2009).

Results of the decomposition reveal that the increase in the unconditional probability gap is largely attributable to the increasing contribution of differences in the impact of characteristics, i.e. to what might be considered as a sort of discrimination against immigrants as regards job loss. In fact, the situation at the end of the period, characterized by high job loss, is in sharp contrast to that deduced from the decomposition for the first quarter of 2008, in which it can be even observed some preference for immigrant workers (as deduced from the positive sign of the component corresponding to differences in the impact of the characteristics in the first quarter of 2008).

Finally, it must be stressed that the detailed decomposition of the unconditional probability gap between natives and immigrants (Table 7) reveals that the increase since the impact of the crisis is entirely attributable to the difference in the constant terms of models for natives and immigrants. Since we can assume that this term includes intrinsic characteristics that are similar for all individuals within each of these groups, that are independent from the observable characteristics that determine the individual probability of job loss, this result can be used to confirm the existence of a bias against immigrants in their chances of job losses during the economic crisis.

6. RESULTS FOR IMMIGRANTS FROM THE ENC

As mentioned in the introduction, the immigrants from the ENC are the largest group in Spain after those from South American countries. Salient among them are North Africans, especially Moroccans. A fundamental difference between immigrants from

ENC and the South Americans is the knowledge of the Spanish language, and greater social and cultural proximity of the latter with the natives. Therefore, a priori one would expect that the integration in the labour market were higher for South Americans than for immigrants from the ENC. Moreover, the literature shows how knowledge of the language is related to worker's productivity and the type of occupation and activity developed in the host country (e.g. Dustmann and Van Soest, 2002; Peri and Sparber, 2009), which could have led to greater probabilities of losing their jobs when the crisis began to seriously affect the Spanish labour market.

Therefore, in this final section we show the results obtained by comparing the probability of loss of employment of natives with that of immigrants from the ENC. An important issue to mention is that for this analysis we can not exploit the quarterly data from the LFS used in the previous sections –which are available on the INE website, since these do not allow us to know the country of origin of immigrants. Instead we used annual data from the LFS (containing information of the four quarters of each year), which in addition to the information previously used in reference to individuals, firms and jobs, allows us to identify individuals from any of the ENC. Since this database contains each of the quarters of the year, we applied the same strategy as defined in section 2 to identify employees which either lost their jobs or maintained them during the corresponding quarter.

Figure 2 shows the rates of job loss for natives, immigrants from LDC, and the ENC immigrants in 2006 (growth period), 2008 (year of slowdown) and 2010 (the year when the crisis hit strongly the labour market). Additionally, the solid line represents the rate for all workers. Broadly speaking, Figure 2 reproduces the features discussed for Figure 1, but now showing how the impact of the crisis on the labour market was more intense in the case of immigrants from the ENC. In fact, there were no significant differences between the rate for ENC immigrants and all immigrants before the crisis. But from 2008 a substantial gap emerged unfavourable to immigrants from those countries, which compared with natives was as large as 10pp in 2010.

The description of the observable characteristics of the ENC immigrants, and their comparison with those of natives and immigrants from other countries confirms that they had an endowment of human capital, and were employed in occupations and

activities that made them more likely of losing their jobs in the crisis. Table 8 shows the descriptive results of some of these characteristics for the three groups of individuals. First at all, it needs to be indicated that, on average, immigrants from the ENC had two years less education than immigrants from other countries, and three less than natives. Accordingly, it is observed that they were more intensely employed in unskilled blue-collar jobs, and that they had greater presence in the primary sector, in construction and industry. Instead its presence in the service sector, including those related to retail, hospitality and personal services (for which the language is an important factor), was less than that of immigrants from other countries. Finally, Table 8 shows that the spatial patterns of localization ENC immigrants differed from those observed for natives and immigrants from other countries. Catalonia, Andalusia and Murcia accounted for 50% of all ENC immigrants in Spain, while the percentage of non-ENC immigrants in these three regions was 30%. In turn, only 9.6% of all ENC immigrants were located in Madrid, while this region concentrated almost 30% of the non-ENC immigrants in the country.

As for the differences between natives and ENC and non-ENC immigrants in the impact of observable characteristics on the probability of job loss, it must be said first that models similar to those described in the previous section were estimated. To save space, we do not report the results here.[14] In any case, they reveal significant differences in the responses between natives and immigrants from ENC as well as differences between immigrants from ENC and non-ENC. We combined the estimated coefficients with the values of the variables in the model for each group of individuals to decompose the gap in the conditional probability of job loss between natives and ENC immigrants. The results for the 3 years under analysis are summarised in Table 9. The first column of results corresponds to the probability gap, while the second and third columns contain the figures of the contribution of, respectively, differences in observable characteristics, and differences in their effect (or the unexplained part of the gap). As we mentioned above, in 2006, before the crisis, the gap was relatively narrow. Actually, it is statistically significant at 95% but not at 99%. Most of the gap unfavourable to ENC immigrants was not explained by differences in observable characteristics. In fact, the part attributable to those differences is not statistically significant, whereas the

[14] They are available from the authors upon request.

unexplained part it is only at 90%. However, as the gap became wider with the impact of the crisis, the unfavourable characteristics of the ENC immigrants emerged as responsible of their higher chances of losing jobs. As a result, the gap observed in 2010 can be almost fully explained by differences in characteristics; the contribution of differences in the impact being not statistically significant.

Summing up, the probability of job loss for the ENC immigrants was even higher than that for immigrants from other countries as a result of their lower endowment of human capital and, accordingly, because they were employed in jobs and activities that were more exposed to the negative consequence of the crisis on the Spanish labour market.

7. CONCLUSIONS

The aim of this study was to provide evidence on the impact of the current economic crisis on employment of immigrants, specifically, if they had less chance of keeping their jobs than natives after the impact of the crisis. Although previous literature did not analyse this issue, our results confirm the economic and social impact of studying it.

Using microdata from the LFS for natives and immigrants, we have shown that there were no substantial differences between them in the rate of job loss before the crisis. However, after the impact of the crisis in late 2008, there was a continued widening of the gap between natives and immigrants. The results confirm that for all immigrants from developing countries, differences in human capital and occupational and sectoral segregation can not explain fully the gap. In other words, that there were differences in the probability of job loss between immigrants and natives of similar personal characteristics, working in analogous occupations and firms. The explanation for this fact can be found in the existence of some kind of discrimination against immigrant workers, so that companies tended first to dismiss immigrants workers rather than natives with similar characteristics. However, it can be argued as well that the differences could be due to the effect of unobservable characteristics, such as the imperfect transferability of human capital (e.g. Friedberg, 2000; Sanromà et al, 2008). In any case, it is worthwhile stressing that discrimination or unobserved characteristics (or both together) only contributed to the existence of a significant gap between natives and immigrants after the impact of the crisis. Or what is the same, it does not appear

that such mechanisms played any role in the expansionary period, characterised by the massive creation of new jobs and not by their destruction.

This conclusion for all immigrants in Spain is not immediately extrapolated to the specific case of immigrants from the ENC. We have provided evidence showing that the impact of the crisis on job loss was greater for immigrants from the ENC. And also that the difference in education attainment, and occupational and sectoral distribution with respect to natives was even greater than that observed for non-ENC immigrants. In fact, in this case, almost all of the gap in the rate of job loss can be attributed to differences in observed characteristics, thus ruling out discrimination against ENC immigrants. In any case, one could argue that what might be behind the results is a phenomenon of segregation, in which discrimination actually takes place through the real possibilities of occupying certain jobs.

Some implications can be derived from the evidence obtained for the Spanish economy. First, the loss of employment for immigrants is an added cost to their own displaced status, especially for recent immigrants. Even for those who are entitled to receive the unemployment benefit, the difficulty of finding another job in a prolonged recession may lead to limited financial resources at its disposal to meet basic needs. Against a backdrop of cuts in social services caused by the budgetary situation in many EU Member States, and in the absence of family support in the host country, the higher chance to lose the job and the fewer options to find another one (as reflected in an unemployment rate for immigrants around 35%) could force immigrants to return to their countries. Even if staying in the host country, a long period without an employment erodes both real social integration and assimilation into the labour market.

In turn, for the host country, and by extension to the whole EU, the presence of a large number of unemployed immigrants has obvious costs. Despite the above, it is possible that a high percentage of unemployed immigrants decide to stay in the host countries, among other reasons because they have no better alternative in their countries of origin and, even without a job in the EU, they can continue enjoying higher levels of security as well as of social protection (including unemployment benefits, and health and education services). In that case, at least temporarily, immigrants stop contributing to

the system and, consequently, do not help to counteract the effects of aging of the native population.

The reduced ability to maintain employment by immigrants can be seen as a cost also for the countries of origin. First, in terms of volume of remittances, which in the case of the countries of North Africa (especially Morocco and Algeria) are an important source of external financing. Secondly, because they have to deal with the return of those who decide to return home, despite suffering many of the countries of origin high unemployment (as in the case of North African countries), especially for the young more skilled population. Finally, because the high rates of job loss may discourage potential future immigrants, and thereby hinder the correction of macroeconomic imbalances in sending countries, and the lack of opportunities for a significant portion of its population.

We believe that these circumstances must be considered when designing and assessing the instruments of the EU migration policy in the context of the ENP. Despite the obvious difficulties that would have the implementation of an action of this type, the results we obtained suggest that, in the context of the ENP, resources should be allocated to improve the human capital of immigrants, and even of potential immigrants in their countries of origin. Among other effects, the increase in the educational level of immigrants would improve their employability and the pace of assimilation into the European labour market.

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Table 1. Descriptive of individual, job, and firm characteristics for natives and immigrants.

	1 quarter 2008		3 quarter 2008		1 quarter 2009	
	Natives	Immigrants	Natives	Immigrants	Natives	Immigrants
Gender						
Male	55.11%	52.41%	54.80%	52.54%	53.53%	50.56%
Female	44.89%	47.59%	45.20%	47.46%	46.47%	49.44%
Age						
16-19 years	1.64%	2.17%	1.57%	2.01%	1.36%	1.84%
20-24 years	8.03%	9.59%	7.49%	10.97%	7.14%	9.23%
25-29 years	12.16%	17.94%	11.91%	17.28%	11.59%	16.83%
30-34 years	13.39%	21.87%	13.66%	21.44%	13.70%	20.18%
35-39 years	14.01%	18.00%	14.03%	18.31%	14.25%	18.37%
40-44 years	15.28%	13.00%	15.18%	13.14%	15.19%	15.25%
45-49 years	14.42%	8.84%	14.68%	8.65%	14.92%	9.87%
50-54 years	12.35%	5.89%	12.54%	5.69%	12.79%	5.85%
55-59 years	8.72%	2.69%	8.95%	2.50%	9.06%	2.59%
Education (years of schooling)	10.84	9.66	10.86	9.76	10.98	9.89
Occupation						
Technicians and professionals	30.06%	4.80%	29.95%	5.39%	31.13%	5.77%
Accontancy, admin and other office empl.	11.54%	4.05%	11.90%	4.41%	11.67%	3.96%
Catering, protection serv, and salepersons	17.00%	19.45%	17.13%	21.90%	17.87%	21.71%
Skilled workers in agric, manuf, and constr	16.78%	23.98%	16.75%	23.05%	15.57%	21.49%
Instalation and machinery operators	11.07%	8.15%	10.90%	8.05%	10.49%	8.95%
Elementary occupations	13.55%	39.58%	13.37%	37.20%	13.27%	38.13%
Sector of activity						
Agriculture, lifestock, forestry and fishing	1.98%	6.21%	1.97%	5.12%	2.16%	6.69%
Food, textile, wood, and paper	5.54%	5.09%	5.49%	5.22%	5.28%	5.57%
Extractive, energy and water	7.78%	4.74%	7.84%	4.90%	7.45%	4.40%
Machinery and transport material	5.34%	2.92%	5.29%	3.56%	5.28%	2.90%
Construction	11.08%	22.54%	10.55%	21.12%	8.94%	18.12%
Retail and hostelery	19.06%	23.69%	19.12%	24.35%	19.34%	24.64%
Transport	6.81%	3.93%	6.87%	4.16%	6.96%	4.79%
Financial serv, real state, and other professional	10.87%	7.60%	11.05%	7.51%	11.52%	7.66%
Public Adm, education and health, other soc ser	31.55%	23.29%	31.83%	24.05%	33.08%	25.22%
Region (NUTS2)						
Andalusia	16.78%	9.04%	16.88%	8.73%	16.41%	9.23%
Aragon	4.70%	5.49%	4.85%	5.25%	4.90%	5.91%
Asturias	2.75%	1.04%	2.61%	1.25%	2.77%	0.92%
Balearic Isl	2.39%	4.05%	2.51%	4.84%	2.44%	4.71%
Canary Isl	5.37%	4.05%	5.44%	4.54%	5.04%	3.96%
Cantabria	2.85%	1.70%	3.00%	1.88%	2.93%	1.78%
Castile-Leon	9.69%	5.81%	9.63%	6.10%	9.58%	5.57%
Castile-La Mancha	6.97%	6.56%	6.95%	6.07%	7.01%	6.10%
Catalonia	11.35%	17.68%	11.26%	17.66%	11.30%	18.51%
Valencia	8.67%	14.10%	8.45%	13.12%	8.29%	11.82%
Extremadura	3.67%	0.52%	3.46%	0.68%	3.58%	0.98%
Galicia	6.47%	2.60%	6.60%	2.56%	6.61%	3.12%
Madrid	5.86%	13.49%	5.86%	13.61%	6.04%	12.46%
Murcia	3.12%	5.52%	3.11%	6.07%	3.16%	6.02%
Navarra	2.41%	2.80%	2.48%	2.37%	2.70%	2.93%
Basc Country	5.17%	2.57%	5.25%	2.48%	5.44%	2.81%
La Rioja	1.78%	2.98%	1.68%	2.80%	1.81%	3.18%
Observations	43729	3461	42950	3675	42733	3588

Table 2. Rates of job loss within characteristics for natives and immigrants.

	1 quarter 2008		3 quarter 2008		1 quarter 2009	
	Natives	Immigrants	Natives	Immigrants	Natives	Immigrants
Gender						
Male	4.00%	10.47%	4.92%	14.40%	6.89%	21.39%
Female	4.75%	9.47%	5.26%	7.45%	6.01%	10.88%
Age						
16-19 years	19.53%	9.33%	25.96%	25.68%	24.44%	36.36%
20-24 years	10.68%	16.27%	13.74%	9.93%	15.80%	13.90%
25-29 years	6.17%	10.79%	6.96%	13.54%	9.53%	17.22%
30-34 years	4.10%	7.66%	4.84%	10.03%	6.51%	16.85%
35-39 years	3.52%	9.47%	4.15%	9.81%	5.94%	15.33%
40-44 years	3.64%	9.33%	3.90%	11.39%	5.17%	15.72%
45-49 years	2.76%	8.17%	3.35%	10.38%	4.50%	19.49%
50-54 years	2.15%	11.76%	2.36%	10.53%	3.86%	9.05%
55-59 years	1.70%	10.75%	2.11%	8.70%	2.45%	10.75%
Education						
University (2 & 3 levels)	2.01%	7.82%	2.59%	6.78%	2.40%	11.72%
University (1 level)	2.27%	6.94%	2.92%	6.38%	2.94%	10.75%
Secondary (2 level)	3.12%	8.73%	3.47%	8.45%	4.20%	16.01%
Vocational training	4.06%	9.97%	3.91%	8.30%	5.82%	12.38%
Secondary (1 level)	5.68%	11.13%	7.39%	13.61%	9.77%	19.48%
Primary	6.81%	11.01%	7.29%	15.09%	9.81%	17.01%
Illiterate / No schooling	9.57%	13.98%	11.48%	18.62%	13.78%	20.66%
Occupation						
Technicians and professionals	1.86%	4.22%	2.64%	4.55%	2.63%	8.70%
Accountancy, admin and other office emp	3.17%	5.00%	3.52%	3.09%	4.53%	11.27%
Catering, protection serv, and salepersons	5.22%	11.29%	5.11%	8.07%	6.67%	12.58%
Skilled workers in agric, manuf, and const	5.37%	10.00%	7.03%	14.64%	9.91%	22.18%
Instalation and machinery operators	3.53%	6.38%	3.89%	7.77%	6.82%	19.00%
Elementary occupations	9.09%	11.31%	10.40%	13.31%	12.66%	15.86%
Sector of activity						
Agriculture, lifestock, forestry and fishing	19.19%	21.40%	21.37%	21.81%	26.71%	22.50%
Food, textile, wood, and paper	4.09%	7.39%	4.58%	6.77%	6.39%	18.00%
Extractive, energy and water	2.53%	7.32%	3.35%	9.44%	4.56%	15.82%
Machinery and transport material	2.78%	3.96%	3.39%	12.21%	5.32%	14.42%
Construction	7.50%	12.56%	10.82%	19.33%	15.45%	28.31%
Retail and hostelery	5.31%	10.73%	5.38%	8.49%	7.44%	14.25%
Transport	3.33%	5.15%	3.35%	9.80%	5.41%	18.60%
Financial serv, real state, and other profes	3.74%	11.79%	3.96%	8.70%	5.12%	12.36%
Public Adm, education and health, other s	2.88%	5.83%	3.53%	6.33%	3.50%	8.29%

Table 3. Marginal effects from the probit model with selection for the entire sample of workers.

	1 quarter 2008		3 quarter 2008		1 quarter 2009	
Nationality (ref. Native)	Marg. Eff.	Sig.	Marg. Eff.	Sig.	Marg. Eff.	Sig.
Immigrant	0.0264	***	0.0228	***	0.0485	***
Gender (ref. Female)						
Male	-0.0185	***	-0.0159	***	-0.0125	***
Age (ref. 16-19 years)						
20-24 years	-0.0242	***	-0.0302	***	-0.0394	***
25-29 years	-0.0349	***	-0.0415	***	-0.0544	***
30-34 years	-0.0396	***	-0.0478	***	-0.0617	***
35-39 years	-0.0409	***	-0.0501	***	-0.0640	***
40-44 years	-0.0412	***	-0.0516	***	-0.0670	***
45-49 years	-0.0433	***	-0.0529	***	-0.0679	***
50-54 years	-0.0429	***	-0.0532	***	-0.0678	***
55-59 years	-0.0405	***	-0.0492	***	-0.0658	***
Education (years of schooling)	-0.0017	***	-0.0024	***	-0.0032	***
Occupation (ref. Unskilled workers)						
Technicians and professionals	-0.0284	***	-0.0251	***	-0.0403	***
Accountancy, admin and other office empl.	-0.0211	***	-0.0246	***	-0.0302	***
Catering, protection serv, and salepersons	-0.0106	***	-0.0184	***	-0.0192	***
Skilled workers in agric, manuf, and constr	-0.0108	***	-0.0151	***	-0.0151	***
Instalation and machinery operators	-0.0133	***	-0.0193	***	-0.0134	***
Sector of activity (ref. Construction)						
Agriculture, lifestock, forestry and fishing	0.0382	***	0.0208	***	0.0099	***
Food, textile, wood, and paper	-0.0169	***	-0.0267	***	-0.0365	***
Extractive, energy and water	-0.0224	***	-0.0303	***	-0.0428	***
Machinery and transport material	-0.0211	***	-0.0270	***	-0.0386	***
Retail and hostelery	-0.0183	***	-0.0318	***	-0.0433	***
Transport	-0.0143	***	-0.0271	***	-0.0354	***
Financial serv, real state, and other professional serv.	-0.0159	***	-0.0298	***	-0.0428	***
Public Adm, education and health, other soc serv.	-0.0254	***	-0.0364		-0.0623	
Civil status (ref. Single)						
Married	-0.0072	**	-0.0019		-0.0033	
Other	0.0005		0.0004		0.0043	*
Living with spouse (ref. Yes)	0.0149	***	0.0058		0.0068	
Number household members	-0.0019	***	-0.0010		-0.0027	**
Number of children	-0.0012	*	-0.0004		-0.0017	
Children < 10 years (ref. No)	-0.0010		0.0003		0.0024	
Observations	70301		68772		68603	
of which censored	23111		22147		22282	

Notes: Marginal effects computed from the conditional probability. The estimated model included all the characteristics described in the text. The results of some of them are not reported in the table to save space. ***, **, and * denote statistical significance at the 99%, 95%, and 90% respectively.

Table 4. Marginal effects from the probit model with selection for the sample of natives and immigrants.

	1 quarter 2008				3 quarter 2008				1 quarter 2009			
	Natives		Immigrants		Natives		Immigrants		Natives		Immigrants	
	Marg. Eff.	Sig.	Marg. Eff.	Sig.	Marg. Eff.	Sig.	Marg. Eff.	Sig.	Marg. Eff.	Sig.	Marg. Eff.	Sig.
Gender (ref. Female)												
Male	-0.0170	***	-0.0249	*	-0.0169	***	0.0275	**	-0.0138	***	0.0386	**
Age (ref. 16-19 years)												
20-24 years	-0.0108	**	0.0356		-0.0119	**	0.0420		0.0016		-0.1397	***
25-29 years	-0.0191	***	-0.0083		-0.0238	***	0.0903	**	-0.0066		-0.1391	***
30-34 years	-0.0266	***	-0.0353		-0.0318	***	0.0447		-0.0224	**	-0.1442	***
35-39 years	-0.0303	***	-0.0233		-0.0361	***	0.0484		-0.0283	***	-0.1503	***
40-44 years	-0.0311	***	-0.0207		-0.0386	***	0.0731		-0.0351	***	-0.1438	***
45-49 years	-0.0342	***	-0.0330		-0.0408	***	0.0591		-0.0393	***	-0.1247	***
50-54 years	-0.0352	***	0.0053		-0.0430	***	0.0566		-0.0420	***	-0.1517	***
55-59 years	-0.0345	***	0.0005		-0.0406	***	0.0268		-0.0481	***	-0.1335	***
Education (years of schooling)	-0.0018	***	-0.0016		-0.0021	***	-0.0039	***	-0.0033	***	-0.0027	
Occupation (ref. Unskilled workers)												
Technicians and professionals	-0.0254	***	-0.0456	**	-0.0241	***	-0.0470	***	-0.0354	***	-0.0528	**
Accountancy, admin and other office empl	-0.0186	***	-0.0512	***	-0.0222	***	-0.0606	***	-0.0266	***	-0.0301	
Catering, protection serv, and salepersons	-0.0115	***	0.0173		-0.0183	***	-0.0129		-0.0187	***	-0.0172	
Skilled workers in agric, manuf, and consti	-0.0106	***	-0.0186		-0.0146	***	-0.0251	**	-0.0145	***	-0.0255	
Instalation and machinery operators	-0.0125	***	-0.0294		-0.0172	***	-0.0490	***	-0.0138	***	-0.0042	
Sector of activity (ref. Construction)												
Agriculture, lifestock, forestry and fishing	0.0401	***	0.0353		0.0272	***	-0.0232		0.0193	***	-0.0541	***
Food, textile, wood, and paper	-0.0136	***	-0.0392	**	-0.0221	***	-0.0564	***	-0.0303	***	-0.0596	***
Extractive, energy and water	-0.0188	***	-0.0391	**	-0.0261	***	-0.0429	***	-0.0350	***	-0.0814	***
Machinery and transport material	-0.0167	***	-0.0624	***	-0.0239	***	-0.0170		-0.0310	***	-0.0817	***
Retail and hostelery	-0.0146	***	-0.0470	***	-0.0269	***	-0.0589	***	-0.0350	***	-0.0940	***
Transport	-0.0105	***	-0.0449	**	-0.0235	***	-0.0218		-0.0291	***	-0.0580	**
Financial serv, real state, and other profess	-0.0131	***	-0.0144		-0.0256	***	-0.0436	***	-0.0347	***	-0.0923	***
Public Adm, education and health, other so	-0.0182	***	-0.0862	***	-0.0289	***	-0.0748	***	-0.0489	***	-0.1373	***
Civil status (ref. Single)												
Married	-0.0003		-0.0079		-0.0007	**	0.0096	***	-0.0017	***	-0.0107	
Other	-0.0007		-0.0021		-0.0015	**	-0.0001		-0.0026	***	0.0011	
Living with spouse (ref. Yes)	-0.0003		0.0080		-0.0007		-0.0089	***	0.0008		0.0124	
Number household members	0.0001		-0.0007		0.0003	**	0.0013	***	0.0006	***	-0.0009	
Number of children	0.0000		-0.0024		0.0001		0.0016	**	0.0002	*	-0.0019	
Children < 10 years (ref. No)	0.0001		-0.0006		-0.0001		0.0017		-0.0004	*	-0.0037	
Observations	65687		4614		63902		4870		63863		4740	
of which censored	21958		1153		20952		1195		21130		1152	

Notes: Marginal effects computed from the conditional probability. The estimated model included all the characteristics described in the text. The results of some of them are not reported in the table to save space. ***, **, and * denote statistical significance at the 99%, 95%, and 90% respectively.

Table 5. Decomposition of the native-immigrant gap in the conditional probability of job loss.

	Gap	Diff in Characteristics	Diff in Impact
1 quarter 2008	-0.057	-0.024	-0.032
3 quarter 2008	-0.060	-0.032	-0.029
1 quarter 2009	-0.097	-0.040	-0.058

Note: All contributions are statistically significant at the 99%.

Table 6. Decomposition of the native-immigrant gap in the unconditional probability of job loss.

	Gap	Diff in Characteristics	Diff in Impact
1 quarter 2008	-0.035	-0.060	0.025
3 quarter 2008	-0.049	-0.028	-0.021
1 quarter 2009	-0.131	-0.035	-0.096

Note: All contributions are statistically significant at the 99%.

Table 7. Detailed decomposition of the native-immigrant gap in the unconditional probability of job loss.

	1 quarter 2008		3 quarter 2008		1 quarter 2009	
	Diff in Characteristics	Diff in Impact	Diff in Characteristics	Diff in Impact	Diff in Characteristics	Diff in Impact
Gap	**-0.035**		**-0.049**		**-0.131**	
Individual Ch.	-0.011	0.054	-0.014	-0.009	-0.015	0.002
Job & Firm Ch.	-0.049	0.029	-0.014	0.005	-0.020	0.018
Constant		-0.058		-0.016		-0.116
Total	-0.060	0.025	-0.028	-0.021	-0.035	-0.096

Note: All contributions are statistically significant at the 99%.

Table 8. Descriptive of (some) observable characteristics for natives and immigrants from ENC and non ENC (2010).

		Natives	Immigrants	
			Non ENC	ENC
Gender				
	Male	53.72%	47.14%	68.20%
	Female	46.28%	52.86%	31.80%
Age (years)		38.51	35.95	37.15
Education (years of schooling)		11.53	10.43	8.47
Occupation				
	Skilled White	32.38%	9.67%	6.40%
	Non-Skilled White	30.16%	28.74%	15.17%
	Skilled Blue	22.72%	23.56%	32.64%
	Non-Skilled Blue	11.84%	37.31%	45.65%
Sector of activity				
	Primary	2.03%	4.76%	17.16%
	Industry	16.72%	10.22%	14.30%
	Construction	7.53%	12.01%	19.54%
	Distribution, Hotels and Rest.	19.64%	28.32%	24.20%
	Transport and Com.	8.21%	6.41%	3.29%
	Financial and real state	13.13%	9.44%	5.14%
	Health, Educ. and Pub. Serv.	30.94%	9.86%	6.28%
	Personal serv.	1.81%	18.99%	10.08%
Region				
	Andalusia	16.73%	8.66%	14.64%
	Aragon	2.78%	2.75%	1.75%
	Asturias	2.22%	1.17%	1.50%
	Balearic Islands	2.33%	3.62%	3.31%
	Canary Islands	3.96%	4.99%	4.11%
	Cantabria	1.35%	0.96%	0.22%
	Castilla Leon	5.58%	2.60%	3.17%
	Castilla La Mancha	4.32%	3.29%	7.14%
	Catalonia	16.52%	18.84%	32.88%
	Valencia	9.77%	11.39%	9.15%
	Extremadura	2.36%	0.47%	0.86%
	Galicia	5.81%	2.82%	0.95%
	Madrid	15.60%	29.79%	9.66%
	Murcia	2.74%	3.88%	7.22%
	Navarra	1.44%	1.40%	0.52%
	Basque Country	5.49%	2.36%	0.90%
	La Rioja	0.72%	0.99%	0.81%

Table 9. Decomposition of the gap between natives and immigrants from ENC in the conditional probability of job loss.

	Gap	Diff in Charateristics	Diff in Impact
2006	-0.032**	0.018	-0.050*
2008	-0.071***	-0.030***	-0.041**
2010	-0.097***	-0.077***	-0.02

Note: ***, **, and * denote statistical significance at the 99%, 95%, and 90% respectively.

Figure 1. Rates of job loss for natives and immigrants in the period under analysis.

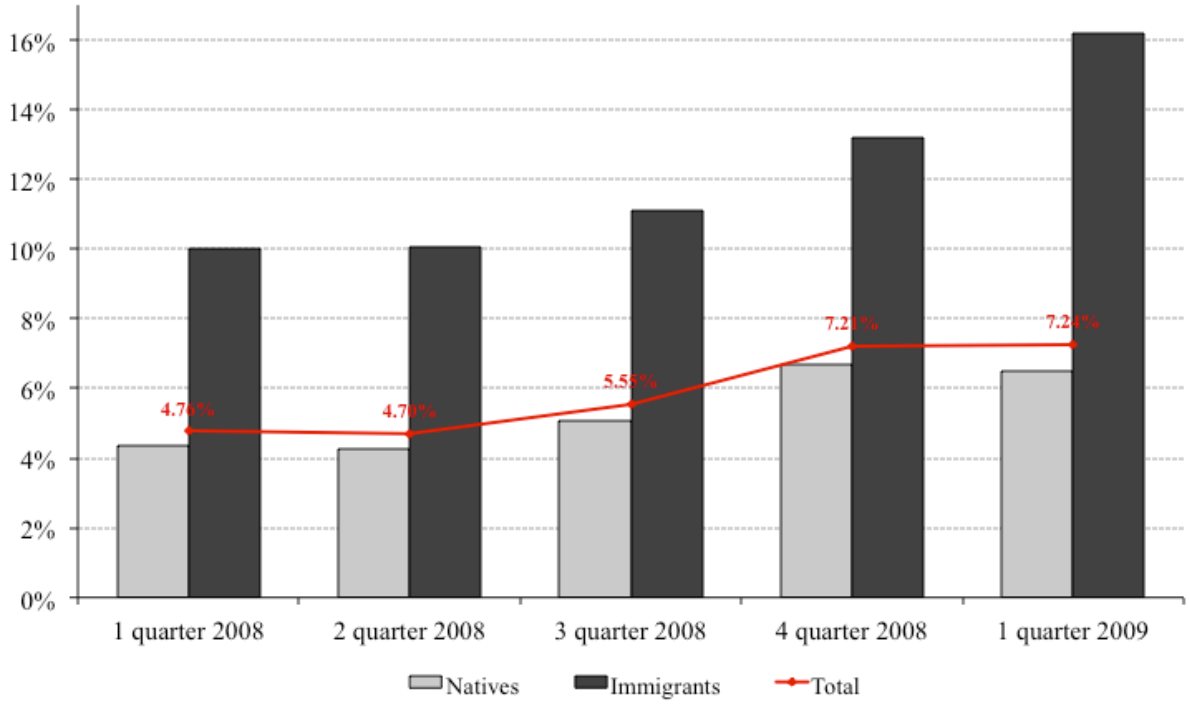

Figure 2. Rates of job loss for natives and immigrants from ENC and non-ENC.