Title:

Geographical mobility and potential wage gain of immigrants within Spain

Abstract

It's well known in the economic literature that geographical mobility of workers within countries is an important means of equilibrating regional disparities in unemployment and wages. Moreover, geographical mobility plays a crucial role to reach a high degree of flexisecurity, i.e. a labour market more flexible and with more opportunities for getting better jobs and higher incomes. Within this context, a topic of great relevancy is the geographical mobility of foreign workers in the destination country. The interest appears because the economic literature has demonstrated that the immigrants have greater mobility than native workers and, the motivation to migrate can differ between both collectives. The study of this topic for the Spanish case is interesting, because Spain is one of the European countries where immigration flows have increased most noticeably. This paper is aimed, first, at studying the determinants of interregional geographical mobility of immigrants in Spain and, second, obtaining consistent estimates of individual's opportunity wages as movers or stayers. With these estimates is possible to obtain the potential wage gain of migration for all individuals, migrants or not, and to prove if this variable influence on the interregional migration decision. Te data used come from The Spanish National Immigrant Survey conducted by the Spanish Statistics Institute (INE, 2007). The econometric methodology proposed is a switching regression model with endogenous switching that is estimated by full information maximum likelihood method.

JEL Classification: F22, J43, J61, R23, R58

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1. Introduction

It's well known in the economic literature that geographical mobility of workers within countries is an important means for equilibrating regional disparities in unemployment and wages [see, for example, empirical evidence in Blanchard and Katz (1992) for the U.S, Decressin and Fatas (1995) for Europe, and Hergoz *et al*. (1993) for a survey on the subject (1993)]. Moreover, within the framework of the Lisbon Strategy, geographical mobility within countries is considered, on one hand, a means of increasing economic growth and, on the other hand, as playing a crucial role to reach a high degree of flexisecurity, i.e. a labour market more flexible and with more opportunities for getting better jobs and higher incomes (Sapir *et al.*, 2003).

In Spain, the low geographical mobility of workers has been considered a factor explaining the high rates of unemployment in the Spanish labour market since the 80s. The existing economic literature in Spain has tried to explain this phenomenon from different points of view and using different datasets. In this sense, it's possible to highlight, first, the paper of Antolín and Bover (1997) who identify which regional economic factors and personal characteristics influence male interregional migration decision, using individual data from the Migration Survey, included in the Spanish Labour Force Survey (INE, 1987-1991). Second, Bover and Arellano (2002) analyse intraregional migration in Spain, combining information from the Residential Variations Data and from the Spanish Labour Force Survey for the period 1988-1992. Some of their main results are that house prices and the share of employment in services have positive effects on intraregional mobility. These authors also find out that the more educated people are more prone to mobility. Third, Abellán (1998) and, Devillanova and García-Fontes (2004) study internal migration from a more disaggregated point of view, by analysing the migration between provinces. Abellán (1998), using the Survey

of Structure, Consciousness and Biography of Classes (INE, 1991), suggests that interprovincial migration follows expected income maximization patterns and it improves the average wage in all Spanish provinces. Finally, Devillanova and García-Fontes (2004) with the information mainly provided from the records of Spanish Social Security from 1978-1992 conclude that job opportunities are important determinants of migration. Thus, workers move away from relatively agricultural provinces to locations with more developed services sectors, higher wages and higher employment growth.

Within this general context, a topic of great relevancy is the geographical mobility of foreign workers in the destination country. The interest appears because the economic literature has demonstrated that immigrants have greater mobility than native workers (see, for example, Newbold, 1999). Moreover, the motivation to migrate can differ between both collectives, being the immigrants more influenced by the social networks and less sensible than natives to regional economic factors as, for example, differences in unemployment rates across regions. Also, those living in their country of birth are no potential returns migrants, i.e, if they relocate, they typically face a loss of more location specific human capital than other potential migrants.

The study of this topic for the Spanish case is interesting because Spain is one of the European countries where immigration flows have increased most noticeably. Thus, the foreign-born population living in Spain increases from 1% of the total population in 1990 to the 12% in 2009 (INE, 2009), converting Spain into the European Union country that most contributes to the increase in the immigrant population. However, not much research has been done on the Spanish labour market regarding the geographical mobility of immigrants within Spain, except from the studies of Recaño (2002) and Pajares (2009). Both papers use information provided by the Residential Variations Data and note that the geographical mobility of foreigners is much higher than that of

the Spanish. For example, Pajares (2009) finds out that, in the year 2007, the mobility of immigrants between municipalities was four times higher than that of the Spanish.

This paper is aimed, first, at studying the determinants of interregional geographical mobility of immigrants in Spain and, second, at obtaining consistent estimates of individual's opportunity wages as movers or stayers. With these estimates it is possible to obtain the potential wage gain of migration for all individuals, migrants or not, and to check if this variable has an influence on the interregional migration decision. Concerning the second purpose, the hypothesis to be tested is whether the internal migration of immigrants in Spain has a positive effect on their careers and wages, so that people migrate when the expected benefits of doing so outweigh the costs (Sjaastad, 1962). In this framework, potential migrants behave as if they seek to maximize lifetime gains from location change. Thus, if wages are proxies of worker productivity, immigration will lead to a better allocation of resources in the labour market and will contribute to increase the average wage in all regions.

The data used in this analysis come from the Spanish National Immigrant Survey, which was conducted by the Spanish Statistics Institute (INE) between 2006 and 2007. This survey is useful to reach the aims of this study since it reports the changes of residence and, in its case, the mobility between regions realized by the immigrants from their arrival to Spain. In addition, this survey has some appealing features with respect to the previous surveys used to analyze the geographical mobility in Spain, which are worth to be emphasized. Thus, the Spanish National Immigrant Survey provides information about the personal characteristics of the immigrants when they arrive at Spain and about their current job. This information is of great utility, first, to evaluate the influence of the characteristics on migration decision and, secondly, it allows quantifying the effect of potential wage gains on the geographical mobility of the immigrants.

The remainder of the paper is organized as follows. In section 2 the model and econometric specification used in the empirical analysis are explained. In section 3, the data are presented. The empirical results corresponding to the models estimates are discussed in section 4. Finally, section 5 contains the concluding remarks.

2. The model and econometric specification

The model described in this section is a switching regression model with endogenous switching, that has as its starting point the human capital model of Sjaastad (1962) and the occupational choice model of Roy (1951). It consists of two wage equations (one for immigrant movers between autonomous communities in Spain and the other are for stayers) as well as an equation describing the dichotomous decision of immigrants to move between autonomous communities in Spain. The sample observations may be thought as falling into one of two mutually exclusive regimes, with the decision equation serving as an endogenous selectivity criterion that determines the appropriate regime (migrant versus non-migrant).

Let $\ln w_{1i}$ and $\ln w_{2i}$ be the log wages for individual i in, for example, 1 and 2 areas, respectively:

$$\ln w_{1i} = \beta'_1 X_i + u_{1i} \quad (1)$$
$$\ln w_{2i} = \beta'_2 X_i + u_{2i} \quad (2)$$

where X_i is a vector that contains, personal characteristics (gender, country of origin, educational level, and the level achieved in the Spanish language proficiency), current employment characteristics (occupation, activity sector, working time, tenure), dummy variables indicating the current autonomous community of residence[1], if they were

[1]With the inclusion of this set of variables, we are trying to capture the degree of regional economic development, as well as other factors such as the endowment in public investment, infrastructure and communications.

working in their home country and prior migration path, i.e. number of countries where he has immigrated before coming to Spain[2]. β_1 and β_2 are vectors of unknown parameters, and u_{1i} and u_{2i} are disturbance terms that follow a normal distribution.

The propensity to migrate of individual i from region 1 to region 2, I^*_i is a function of the difference between $\ln w_{2i}$ and $\ln w_{1i}$ and of the cost of moving from region 1 to region 2, c_i:

$$I^*_i = f (\ln w_{2i} - \ln w_{1i}, c_i) \tag{3}$$

The cost of moving is specified as:

$$c_i = \delta' Z_i + u_{ci} \tag{4}$$

where Z_i is a vector that includes as regressors some personal characteristics of the immigrant when arriving at Spain (age, marital status, if he lives in a home for free). δ is a vector of unknown coefficients, and u_{ci} is an error term normally distributed.

Assuming a linear model for I^*_i:

$$I^*_i = \delta_2 (\ln w_{2i} - \ln w_{1i}) + \delta' Z_i + u_{ci} \tag{5}$$

I^*_i is an unobservable variable that determines if the immigrant i is a mover or stayer within Spain. So, it is necessary to use a dichotomous variable that takes the value 1 when the individual has migrated and 0, otherwise:

$$\begin{aligned} I_i &= 1 \text{ if } I^*_i > 0 \\ I_i &= 0 \text{ if } I^*_i \leq 0 \end{aligned} \tag{6}$$

[2]With the variable that shows the number of countries where the worker has resided before coming to Spain, encompassing various aspects related to his accumulation of knowledge about the functioning of labour markets, which may be useful for selecting a more suitable job. In particular, we can expect a positive correlation between the number of countries visited and the work experience of the individual.

Since w_{2i} is only observed if the individual changes region, and w_{1i} if he does not change, the selection equation structural form (5) cannot be directly estimated. However, it is possible to obtain the selection equation reduced form:

$$I^*_i = \delta_2 (\beta_2 - \beta_1)' X_i + \delta' Z_i + u_{ci} - \delta_2 u_{2i} - \delta_2 u_{1i} = \delta^{*'} Z_i^* + \varepsilon_i \quad (7)$$

where $\delta^{*'} = [\delta_2 (\beta_2 - \beta_1)', \delta']$, $Z_i^* = (X_i, Z_i)$ and $\varepsilon_i = u_{ci} - \delta_2 u_{2i} - \delta_2 u_{1i}$.

Log-wage regression model, equations (3) and (4) have to be estimated on truncated samples. For movers, $I^*_i > 0$, the wage regression for (3) is:

$$E (\ln w_{2i} / X_i , I^*_i > 0) = \beta'_2 X_i + E (u_{2i} / I^*_i > 0) \quad (8)$$

Acordingly, for stayers for whom $I^*_i \leq 0$, the regression function is:

$$E (\ln w_{1i} / X_i , I^*_i \leq 0) = \beta'_1 X_i + E (u_{1i} / I^*_i \leq 0) \quad (9)$$

Assuming normality for ε_i, u_{1i} and u_{2i}, with zero mean and non-singular covariance matrix, Σ, specified as:

$$\Sigma = \begin{bmatrix} \sigma_\varepsilon^2 & \sigma_{\varepsilon,1} & \sigma_{\varepsilon,2} \\ \sigma_{\varepsilon,1} & \sigma_1^2 & \sigma_{1,2} \\ \sigma_{\varepsilon,2} & \sigma_{1,2} & \sigma_2^2 \end{bmatrix} \quad (10)$$

Equations (8) y (9) become:

$$E (\ln w_{2i} / X_i, I_i^* > 0) = \beta'_2 X_i + \frac{\sigma_{2\varepsilon}}{\sigma_\varepsilon} \lambda_{2i} \quad (11)$$

$$E (\ln w_{1i} / X_i, I_i^* \leq 0) = \beta'_1 X_i + \frac{\sigma_{1\varepsilon}}{\sigma_\varepsilon} \lambda_{1i} \quad (12)$$

where λ_{2i} and λ_{1i} are the inverse Mills ratios to left censored distributions and right censored distributions, respectively[3].

A two-stage method to estimate the endogenous switching model would involve, first, the estimation of a probit of the criterion equation (7) with the object of predicting the inverse Mills ratios λ_{2i} and λ_{1i}. Second, these predicted variables would be included in equations (11) and (12). However, this method is inefficient and requires potentially cumbersome adjustments to derive consistent standard errors, because the correct covariance matrix of the estimates is very complicated (Lee, 1978). A more efficient version of the endogenous switching model can be estimated by full information maximum likelihood (FIML) method (Greene, 2000). The FIML method simultaneously estimates the probit criterion and the wage regression equation to yield consistent errors. Given the assumption of trivariate normal distribution for the error terms, the logaritmic likelihood function for the system of equation is:

$$LnL = \sum_{i}^{N} \{ I_i[\ln(F\left(\frac{\delta^{*'} Z_i^* + \rho_{2,\varepsilon}(Y_{2i} - X'_{2i}\beta_2)/\sigma_2}{\sqrt{1-\rho_{2,\varepsilon}^2}}\right) + \ln(f((Y_{2i} - X'_{2i}\beta_2)/\sigma_2)/\sigma_2)] +$$

$$+(1-I_i)[\ln(1-F\left(\frac{\delta^{*'} Z_i^* + \rho_{1,\varepsilon}(Y_{1i} - X'_{1i}\beta_1)/\sigma_1}{\sqrt{1-\rho_{1,\varepsilon}^2}}\right) + \ln(f((Y_{1i} - X'_{1i}\beta_1)/\sigma_1)/\sigma_1)] \} \quad (13)$$

where f and F are the probability density and cumulative distribution functions of the standard normal distribution, $\rho_{2,\varepsilon}$ is the coefficient of correlation between u_{2i} and ε_i, and $\rho_{1,\varepsilon}$ is the coefficient of correlation between u_{1i} and ε_i. The signs of these

[3] $\lambda_{1i} = \frac{f\left(\frac{\delta^{*'} Z_i^*}{\sigma_\varepsilon}\right)}{F\left(\frac{\delta^{*'} Z_i^*}{\sigma_\varepsilon}\right)}$ and $\lambda_{2i} = \frac{f\left(\frac{\delta^{*'} Z_i^*}{\sigma_\varepsilon}\right)}{1-F\left(\frac{\delta^{*'} Z_i^*}{\sigma_\varepsilon}\right)}$, where f and F are the probability density and cumulative distribution functions of the standard normal distribution. See Maddala (1983).

correlation coefficients, $\rho_{2,\varepsilon}$ and $\rho_{1,\varepsilon}$ have economic interpretations. If they have alternative signs (positive and negative, respectively) it would imply that the decision to migrate within Spain would have a comparative advantage for workers who change or not from region, since their wages would be higher than an individual chosen randomly from the sample.

The application of FIML method corrects the selection bias in the log-wage equations (1-2) caused by the fact that some unobserved characteristics that influence the probability of change of region also determine the wages that immigrants receive once they are employed.

The estimates of β_1 and β_2 allow estimating the wage gain of migration for all individuals:

$$\hat{WG}_i = \hat{X}_i'(\hat{\beta}_2 - \hat{\beta}_1) \tag{14}$$

This variable would allow to obtain the influence of potential wage gain on the probability of interregional mobility from immigrants in Spain through, its inclusion in equation (7):

$$I^*_i = \delta_{2i}\,\hat{WG}_i + \delta' Z_i + \varepsilon_i^* \tag{15}$$

In this model ε_i^* is an heteroskedastic error term:

$$\varepsilon_i^* = \varepsilon_i + \delta_{2i}\,(WG_i - \hat{WG}_i) \tag{16}$$

where $WG_i = (\ln w_{2i} - \ln w_{1i})$ is the true wage gain of change of region.

If δ_{2i} is a positive and statistically significant parameter, it would prove that interregional movements of immigrants in Spain have taken place according to a process of maximizing wage gains.

3. Data

The data set is the Spanish National Immigrant Survey (INE, 2007). The main objective of this survey is to provide information on the immigrants, aged 16 years old and over, who have been in Spain for longer than one year, or have the intention of doing so (15465 individuals). The information includes residential trajectory within the different municipalities in Spain and work trajectory (first and current employment situation).

Since one of the main variables of the model is the wage, it only takes into account wage earners immigrants[4] at the time of conducting the survey. This group, composed by 8207 individuals, represents the 53% of the initial sample (15465 individuals). Moreover, in order to control the heterogeneity of the immigrant population, we restrict the sample to individuals who arrived at Spain between 1997-2007, which is a homogenous period of expansion in the Spanish economy, so the effects of the economic cycle on the migration decisions are minimized. The Spanish National Immigrant Survey allows for two mutually exclusive choices as response of the workers about the wage: they can provide the exact value of their current wage or its location within a closed interval question. Individuals who choose the second option, i.e. answer that their wages are within a certain range, represent 15% of wage earners. Following, Sanromá *et al*. (2009), in these cases, the wages have been calculated at the midpoint of the corresponding wage interval. Once the observations that do no meet the above requirements have been eliminated and the missing and anomalous values dropped out, the sample used in the estimates is composed by 5314 individuals. The descriptive statistics of the variables for the total sample and for the two groups, formed by individuals that change and do not change of region, are shown in table 1.

[4] Immigrants' wages are expressed in monthly terms and correspond to the pay received for their principal job in net terms (after deductions, contributions and other similar payments).

Table 1. Sample characteristics of variables used in the estimates

Variables	All sample		Stayers		Movers	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
Logarithm monthly wage	6.81	0.41	6.80	0.42	6.84	0.39
Regressors in the wages equations						
Personal characteristics						
Gender						
Female	0.47	0.50	0.48	0.50	0.43	0.50
Male	0.53	0.50	0.52	0.50	0.57	0.50
Geographic origin						
Africa	0.12	0.32	0.11	0.31	0.17	0.37
Asia	0.02	0.14	0.02	0.13	0.02	0.18
South America	0.53	0.50	0.54	0.50	0.53	0.50
EU-15 countries[a]	0.06	0.23	0.06	0.24	0.05	0.21
Rest of European countries	0.27	0.44	0.27	0.44	0.23	0.42
Spanish language proficiency						
Fluent	0.14	0.34	0.14	0.34	0.13	0.34
Not fluent	0.86	0.34	0.86	0.34	0.87	0.34
Educational level						
Not education	0.08	0.20	0.08	0.20	0.09	0.21
Primary	0.15	0.35	0.15	0.35	0.15	0.37
Lower secondary	0.15	0.35	0.15	0.35	0.15	0.35
Upper secondary	0.42	0.50	0.42	0.49	0.42	0.49
Short-cycle higher education	0.18	0.38	0.18	0.38	0.17	0.37
Long-cycle higher education	0.01	0.14	0.02	0.14	0.02	0.14
Current employment characteristics						
Occupation						
Management of companies and public administration	0.01	0.11	0.01	0.11	0.02	0.12
Scientific and intellectual professionals and technicians	0.04	0.20	0.04	0.20	0.04	0.18
Support technicians and professionals	0.04	0.20	0.04	0.20	0.05	0.21
Administrative type employees	0.04	0.20	0.04	0.20	0.04	0.19
Catering, personal services, security and retail workers	0.20	0.40	0.20	0.40	0.20	0.39
Workers skilled in agriculture and fishing	0.01	0.11	0.01	0.11	0.01	0.08
Crafstmen and skilled manufacturing	0.20	0.40	0.20	0.40	0.22	0.41
Installation and machinery operators	0.07	0.26	0.07	0.26	0.09	0.29
Unskilled workers	0.39	0.19	0.39	0.19	0.37	0.20
Activity sector						
Agriculture and fishing	0.07	0.25	0.07	0.25	0.08	0.27
Manufacturing	0.14	0.34	0.14	0.34	0.21	0.40
Construction	0.22	0.41	0.21	0.40	0.23	0.42
Wholesale and retail trade	0.09	0.29	0.10	0.30	0.07	0.25
Hotels and restaurants	0.14	0.34	0.14	0.34	0.14	0.35
Transport	0.04	0.20	0.04	0.20	0.05	0.21
Financial intermediation, real estate, renting, and business activities	0.08	0.26	0.08	0.27	0.07	0.26
Education, health, public administration	0.05	0.22	0.05	0.22	0.04	0.20
Household activities	0.14	0.34	0.14	0.20	0.09	0.30
Other social and personal service activities	0.03	0.17	0.03	0.17	0.02	0.15
Working time						
Full-time contract	0.82	0.38	0.81	0.38	0.85	0.35
Part-time contract	0.18	0.38	0.19	0.38	0.15	0.35
Tenure (years)	2.40	1.87	2.44	1.89	2.23	1.73
Current Spanish regions of residence						
Andalusia	0.07	0.24	0.07	0.25	0.05	0.20
Galicia	0.03	0.13	0.02	0.13	0.02	0.15
Castilla-La Mancha	0.03	0.23	0.05	0.22	0.08	0.27
Extremadura	0.03	0.13	0.01	0.13	0.02	0.15
Valencia	0.09	0.27	0.08	0.27	0.08	0.27
Murcia	0.09	0.28	0.08	0.27	0.13	0.33
Canary Islands	0.03	0.18	0.04	0.19	0.02	0.14
Asturias	0.02	0.13	0.02	0.13	0.02	0.14
Cantabria	0.02	0.13	0.03	0.16	0.02	0.14
Basque Country	0.03	0.17	0.03	0.17	0.04	0.19
Navarra	0.03	0.17	0.08	0.28	0.11	0.31
Aragón	0.08	0.28	0.06	0.21	0.06	0.20
La Rioja	0.05	0.21	0.04	0.20	0.08	0.23
Madrid	0.14	0.35	0.16	0.36	0.06	0.26
Castilla-León	0.04	0.19	0.03	0.19	0.06	0.22
Balearic Islands	0.06	0.24	0.06	0.24	0.06	0.22
Catalonia	0.13	0.30	0.14	0.34	0.10	0.27
Working in his home country						
Yes	0.68	0.46	0.67	0.46	0.70	0.45
No	0.32	0.46	0.33	0.46	0.30	0.45
Prior migration path	1.23	0.76	1.23	0,76	1.26	0.80
Regressors in the model of the cost of moving						
(observed when the individual arrives at Spain)						
Age	29.23	8.70	29.43	8.80	28.20	8.07
Marital status						
Married	0.38	0.46	0.39	0.46	0.31	0.46
Single	0.62	0.46	0.61	0.46	0.69	0.46
Free housing						
Yes	0.20	0.40	0.17	0.38	0.32	0.46
No	0.80	0.40	0.83	0.38	0.68	0.46
Sample size	5314		4540		774	

Notes:
(a) Immigrants from the U.S and Canada are included in this group.
Source: Spanish National Immigration Survey (INE, 2007).

Through the information provided in this table, it appears that the percentage of immigrants who changed of region in Spain is 15%[5], being the mean of the logarithm monthly wage for this group higher than the corresponding to the stayers[6].

The first group of regressors that are considered as influential on the wage equation corresponds to the personal characteristics. Within this group are included the following variables: gender, country of origin, Spanish language proficiency and educational level. Among the more relevant results it is noteworthy, first, that the proportion of males inside the group of immigrants who carry out change of region is superior to the correspondent for those who do not change (57% versus 52%). Second, with respect to the variable that informs about the country of birth, immigrants have been sorted distinguishing between the following areas: Africa, Asia, South America, a group of countries composed for EU15, EEUU and Canada (these last two countries only represent 5.9% of the whole of this group) and, finally the rest of European countries. The descriptives showed that the collective more represented in all situations is South American people, being more than half of the sample. By mobility status, we can highlight some significant differences. The proportion of immigrants proceeding from Africa is higher for the people who migrate within Spain (17% for movers and 12% for stayers). People from European countries are more represented in the group of stayers (33% versus 28%). The proportion of immigrants who speak Spanish fluently is quite similar in all situations, approaching 15% of the sample. Finally, educational level predominant in both groups (movers and stayers) is upper secondary with a percentage of the 42% of the sample of immigrants, followed by short-cycle higher education with a proportion of around 18% of all individuals.

Regarding current employment characteristics, first, it is remarkable that the occupation variables are constructed following the National Classification of

[5] Individuals who after making a change of region have returned to their starting autonomous region have been considered as stayers, because the region of origin and destination are the same.
[6] After application of an independent t-test, it is statistically verified that the mean of the logarithm monthly wage is different for movers and stayers.

Occupations[7] (CNO-94). The information provided by table 1 about these variables shows, on one hand, that unskilled workers are the predominant group in all situations, with a percentage close to 40%. On other hand, it is noteworthy that the group composed by operators is more represented in the collective of movers (9% versus 7%). Finally, the proportion of immigrants who engage in highly skilled occupations is quite low. For example, the immigrants who engage management of companies and Public Administration in the group of stayers (movers) are only the 1% (2%) of the whole sample. Second, the results for the dummy variables created for activity sectors according to the National Classification of Economic Activities (CNAE-1993) indicate that economic activities undertaken by the community of immigrants in Spain is mainly concentrated in the following economic sectors: construction, manufacturing, hotels and restaurants, and household activities. The total count of sectors represents a percentage of 64% of the total sample. If workers are distinguished according to their attitude towards geographical mobility some interesting features are observed. For example, the percentage of employees in the manufacturing sector increases by 6 percentage points for the group of immigrants who move between regions in Spain, while if engaged in household activities, the opposite occurs, decreasing by 5 percentage points their representation in the group of mobile workers. Wiht respect to other characteristics of current employment, it is noteworthy that in all situations, more than three quarters of the immigrant population has full-time jobs, being the proportion of workers with these jobs slightly higher for movers (85% *versus* 81%). It can also be observed that the average tenure stands at around two and half years.

The distribution of the working immigrant population among autonomous communities of residence shows that Madrid and Catalonia are the regions with higher percentages, about 15%, for the group of stayers; while for mobile workers, Murcia and

[7] The criteria used in this classification are the type of work carried out and the qualification required.

Catalonia are the regions more represented within the sample. Finally, to end the with descriptive information of the regressors included in the wage equations, it is noted that 68% of migrants living in Spain had a previous work in their country of origin, being this percentage a bit higher for movers (70% *versus* 67%) and that average number of countries where the immigrants have immigrated before coming to Spain is about 1.20.

Concerning variables that are considered as proxies of the costs of worker mobility and that are observed when the individuals arrive at Spain, the descriptive statistics highlight first, that the average age for those reporting a change of region is lower than the corresponding to those who don't change. Second, the proportion of immigrants who are married is higher for stayers than for movers (39% versus 31%). Finally, the percentage of people with free housing is significantly lower for workers who don't change of region (17% for stayers versus 32% for movers).

4. Results

This section presents the results obtained after estimating the model described in section 3. First, table 2 shows the estimated coefficients of the reduced probit model that represents the migration decision of immigrants arriving at Spain. Second, table 3 presents the coefficient estimates for log-wage equations and the estimations of the coefficient of correlation between u_{2i} and ε_i, $\rho_{2,\varepsilon}$, and between u_{1i} and ε_i, $\rho_{1,\varepsilon}$.

With respect to the main outcomes reports in table 2 it is noteworthy, first, that the variable gender doesn't have influence on the probability of moving. This result is similar to the one obtained by Abellán (1998) when analysing the interprovincial migration in Spain. Second, variables that point out the country of origin are statistically significant and have the expected sign. So, people from less developed countries are more likely to switch of region. Presumably, this result is due to that their initial working situations in Spain are more precarious than those of immigrants from more

Table 2. Probit estimates of the probability of interregional geographical mobility[a] (Reduced model)

Variables	Coefficient[b]
Constant	
Gender	
Male	-0.064
Geographic origin	
Africa	0.168**
Asia	0.460**
EU-15 countries	-0.176*
Rest of European countries	-0.146**
Spanish language proficiency	
Fluent	-0.023
Educational level	
Primary	0.131
Lower secondary	0.136
Upper secondary	0.153*
Short-cycle higher education	0.125
Long-cycle higher education	0.297*
Occupation	
Management of companies and public administration	0.106
Scientific and intellectual professionals and technicians	-0.053
Support technicians and professionals	0.201*
Administrative type employees	0.063
Catering, personal services, security and retail workers	0.068
Workers skilled in agriculture and fishing	-0.370*
Crafstmen and skilled manufacturing	0.032
Installation and machinery operators	0.197**
Activity sector	
Agriculture and fishing	-0.099
Construction	0.029
Wholesale and retail trade	-0.256**
Hotels and restaurants	-0.109
Transport	-0.191*
Financial intermediation, real estate, renting, and business activities	-0.047
Education, health, public administration	-0.324**
Household activities	-0.216**
Other social and personal service activities	-0.442**
Working time	
Full-time contract	0.216***
Tenure (in years)	-0.029**
Current Spanish regions of residence	
Galicia	0.171
Castilla-La Mancha	0.534***
Extremadura	0.431**
Valencia	0.265**
Murcia	0.429***
Canary Islands	-0.057
Asturias	0.390**
Cantabria	0.183
Basque Country	0.379**
Navarra	0.307**
Aragón	0.369**
La Rioja	0.270**
Madrid	-0.218*
Castilla-León	0.416**
Balearic Islands	0.177
Catalonia	-0.103
Working in his home country	0.097**
Prior migration path	-0.001
Regressors in the model of the cost of moving (Observed when the individual arrives at Spain)	
Age	-0.005**
Marital status	
Married	-0.086*
Free housing	
Yes	0.446***
Sample size	5314

Notes:
(a) The reference is a woman, South American, not fluent in Spanish language, without education, working in manufacturing sector as unskilled worker and with a part-time contract, Andalusia is his current Spanish region of residence, without job in their country of origin and when he arrived in Spain was not married and did not live in a rent-free housing.
(b) (***) Significant at 1%, (**) at 5%, (*) at 10%.
Source: Spanish National Immigration Survey (INE, 2007).

developed economies like the European, especially those of the EU15 countries, and therefore they have more need for improving their careers, which may be associated with a change of region. Third, speaking Spanish fluently is not a relevant variable in

the reduced model that determines the probability of geographical mobility. However, this variable is a regressor included in the wage equations and, therefore, observed in 2007, which implies that there may be immigrants who, although not fluent in Spanish at the time of the region change, they are at present.

About the role of education on geographical mobility, economic theory provides different predictions, depending on the type of human capital acquired by individuals. The theory of firm-specific human capital predicts that training increases job duration and therefore inhibits job mobility (Jovanovic, 1979). On the other hand, general human capital should increase mobility in markets with imperfect information because better educated persons should be better able to collect and process information, reducing search and transaction costs (Greenwood, 1975). In this study, it's not possible to directly analyze the influence of specific human capital on wages and on the decision to immigrate, since it is a variable not included in the Spanish National Immigrant Survey (INE, 2007). On the contrary, the effect of general human capital investment is possible to observe, because the educational attainment of immigrants is known[8]. In particular, a set of educational dummy variables is included as regressors in order to detect nonlinearity in the effect of the education. Our findings in this paper are consistent with the predictions of economic theory, since the more educated individuals, those with long-cycle higher education, are more likely to change of region. Regarding the variables that characterize the job currently being undertaken, it highlights the following results: that full time employees and workers who currently are support technicians or operators show a greater propensity to have changed from region and that those individuals employed in education, health, public administration or other social and personal service activities are more likely to be stayers. With respect to current Spanish

[8] For the vast majority of people in the survey, the stated educational level coincides with the one obtained in their home countries, only 5% of immigrants in the sample continued studies in Spain.

regions of residence, Madrid is the autonomy where workers are less likely to have changed of region.

Concerning the regressors included in the model of the costs of moving and observed when the individual arrives at Spain, it must be noted that all coefficients are statistically significant and have the expected sign. First, the negative coefficient of the age variable indicates that the marginal propensity to migrate is higher for young immigrants, which is coherent with the human capital model of migration since the expected net income from location change diminishes with age. Second, being married influences negatively the probability of regional change, as pointed out by Robison and Tomes (1982). Marital status affects the cost of moving, since a member of a family unit has to take into account the change in earning of other family members. Finally, as expected, immigrants living in free housing, provided by relatives or by the company who hired them to come to Spain have more options for location change.

Table 3 presents the coefficient estimates for log-wage equations and correlation coefficients that indicate the presence of sample selection. In addition, the likelihood ratio test for joint independence of the estimated model (log-wage equations and reduced probit model) is reported at the end of the table. The result associated with this test confirms the econometric methodology applied, since the hypothesis of non-random selection in the group of workers that change of region is accepted.

The positive sign of the estimated coefficient, $\hat{\rho}_{2,\varepsilon}$, and the negative sign of the estimated coefficient, $\hat{\rho}_{1,\varepsilon}$, would indicate that the self-selection process induced by the interregional mobility would increase the average wages in the regions of origin and the destination. However, as in Abellán (1998) who focuses on the wage-earning population in Spain or in Nakosteen and Zimmer (1981) who study inter-state migration in the United States, only the coefficient of correlation $\rho_{1,\varepsilon}$ is statistically significant.

Table 3. Estimates of the log-wage equations[a]

Variables	Stayers (Coefficients[b])	Movers (Coefficients[b])
Gender		
Male	0.179***	0.194***
Geographic origin		
Africa	-0.068***	-0.045
Asia	-0.117***	-0.054
EU-15 countries	0.089***	0.117***
Rest of European countries	0.011	0.011
Spanish language proficiency		
Fluent	0.045**	0.047^
Educational level		
Primary	0.006	0.082
Lower secondary	0.014	0.014
Upper secondary	0.016	0.027
Short-cycle higher education	0.068**	0.103**
Long-cycle higher education	0.210***	0.068
Occupation		
Management of companies and Public Administration	0.494***	0.454***
Scientific and intellectual professionals and technicians	0.421***	0.479***
Support technicians and professionals	0.190***	0.130**
Administrative type employees	0.097***	0.062
Catering, personal services, security and retail workers	0.032**	0.006
Workers skilled in agriculture and fishing	0.043	0.048
Crafstmen and skilled manufacturing	0.088***	0.028
Installation and machinery operators	0.089***	0.107**
Activity sector		
Agriculture and fishing	-0.027	-0.012
Construction	0.104***	0.094***
Wholesale and retail trade	-0.013	-0.044
Hotels and restaurants	0.048**	-0.002
Transport	0.128***	0.076
Financial intermediation, real estate, renting, and business activities	-0.019	0.021
Education, health, public administration	-0.027	-0.065
Household activities	-0.132***	-0.135**
Other social and personal service activities	-0.008	-0.071
Working time		
Full-time contract	0.384***	0.411***
Tenure (in years)	0.023**	0.019**
Current Spanish regions of residence		
Galicia	-0.134***	-0.148*
Castilla-La Mancha	-0.090**	-0.048
Extremadura	-0.094**	-0.102
Valencia	-0.074**	0.027
Murcia	-0.056**	0.021
Canary Islands	0.007	0.005
Asturias	-0.116**	0.061
Cantabria	-0.065**	0.094
Basque Country	-0.045^	0.114*
Navarra	0.024	0.079^
Aragón	-0.064**	-0.064
La Rioja	-0.025	0.092^
Madrid	0.008	0.017
Castilla-León	-0.149***	-0.128**
Balearic Islands	0.065**	0.138***
Catalonia	0.050**	0.048
Working in his home country	0.031**	0.044***
Prior migration path	0.026***	0.008
Constant	6.147***	-1.355***
$\hat{\rho}_{1,\varepsilon}$	-0.613***	
$\hat{\rho}_{2,\varepsilon}$		0.109
LR test of indep. eqns.	18.25***	
Sample size	5314	

Notes:
(a) The reference is a woman, South American, not fluent in Spanish language, without education, working in manufacturing sector as unskilled worker and with a part-time contract, Andalusia is his current Spanish region of residence and without job in their country of origin.
(b) *** Significant at 1%, ** at 5%, * at 10%, ^ at 15%.
Source: Spanish National Immigration Survey (INE, 2007).

Thus individuals who choose not to migrate earn higher wages than a random individual from the sample would have earned. The explanation for this result could correspond to a situation where individuals with regional-specific human capital do not

move, because if they did their wages would decrease, since their skills would be less valued in other regions.

The results obtained from the regressors included in the log-wage equation reflect some results typically found in the literature. With respect to personal characteristics, first, there is a favorable wage differential for men in relation to women both for movers and for stayers. In particular, the expected average monthly wage of males exceeds that of women in around 20%[9]. Second, the geographical area of origin of immigrants is an important variable to explain the differential wage for workers. EU-15 workers are those with higher wages for both stayers and movers. For the latter group, the mean expected wage is a 12.4% higher than the corresponding to the rest of national groups. For stayers, the most disadvantaged groups are Asian workers, with a mean expected wage that is 11% lower than the omitted category (South American workers). Third, concerning to human capital variables, on one hand, to be fluent in Spanish language has a positive influence on earnings and, on other hand, the highest returns to education are for individuals with higher education (long-cycle for stayers and short-cycle for stayers).

In relation to the variables that reflect the employment characteristics, it is observed that technician occupations are the better paid for both stayers and movers. Thus, managers have a salary higher by more than 50% to the corresponding to unskilled. Immigrant workers worse off in the wage distribution are those performing household activities and with part-time contracts. Finally, tenure (that is a proxy of training) has a positive and significant impact on earnings. Particularly, an increase of a year in the seniority generates an increase in salary of 2%.

In relation to the rest of variables included in the log-wage equations it is noteworthy, first, that Balearic Island is the Spanish region that offers highest wages.

[9] The model is semi-logarithmic then the effect of the dummy variable is estimated by calculating the exponential of its coefficient and subtracting 1 (see Halvorsen and Palmquist, 1980).

Second, immigrants who have had labour experience in their home countries have higher wages than the rest.

The final step of the econometric methodology applied in this paper is estimation of the structural probit equation. In this model an individual will move from a given origin region when outside permanent income, net of moving cost, exceeds permanent income in the origin region. The estimated coefficients from the log-wage equations allow the estimation of permanent income in both regions for each individual. Thus the predicted difference in log wages are directly used for estimating the probability of moving. The estimates[10] that are displayed in Table 4 show that the expected wage gain has a significant positive influence on the likelihood of change of region, that is, individuals choose among competing alternatives in part on the basis of anticipated incremental returns.

Table 4. Probability of interregional geographical mobility (Structural model)

Variables	Coefficient
Constant	-0.928***
Predicted differential wage	1.411***
Age	-0.084*
Marital status	
Married	-0.007**
Free housing	
Yes	0.457***
Sample size	5314

Notes:
(a) The individual of reference was not married and did not lived in a rent-free housing, when he arrived at Spain.
(b) (***) Significant at 1%, (**) at 5%, (*) at 10%.
Source: Spanish National Immigration Survey (INE, 2007).

This result is in agreement with those obtained in the paper cited above, Abellán (1998) for the entire working population in Spain, Nakosteen and Zimmer (1981) in the U.S., or Robison and Tomes (1982) in Canada. Finally, with respect to the variables which approximate the costs of change of region, it is noted that all of them are relevant and their influences on the probability of moving have the expected signs. Moreover,

[10] The standard errors of the estimates are heteroskedasticity-consistent standard errors.

the magnitudes of their coefficients are similar to that obtained when the model is estimated in its reduced form (table 2).

5. Conclusions

Nowadays, the promotion of geographical mobility is considered in the EU countries as an important factor to increase the flexisecurity and employability of workforce. Within this context, a topic of great relevancy is the geographical mobility of foreign workers within the destination countries. This issue is particularly important in Spain where the foreing-born population represents the 12% in 2009.

In this sense, in this paper we have studied, first, the determinant of interregional mobility of immigrants within Spain and, second, we have tested whether the internal migration of foreign workers in Spain has a positive effect on their career and wages. The data used in this study have come from The Spanish Immigrant Survey, which was conducted by the Spanish Statistics Institute (INE, 2007).

The econometric methodology proposed consists of a switching regression model with endogenous switching. This model is formed by three equations: two wage equations (one for immigrant movers between regions and the other for stayers) as well as an equation describing the dichotomous decision of foreign workers to move between regions. The estimation method applied is full information maximum likelihood method that corrects for the selection bias in the log-wage equations caused by the fact that some unobserved characteristics that influence the probability of change of region also determine the wage the immigrants receive once they are employed. Furthermore, this method yields a consistent covariance matrix of the estimates.

The main conclusions obtained from the estimates are, first, that the likelihood ratio test for join independence confirms the hypothesis of non-random selection in the group of workers that change of region. Second, stayers have wages higher than those corresponding to individuals chosen randomly from the sample. Third, the estimates of

the reduced probit model show, on one side, that all regressors included in the model that represents the cost of moving are statistically significant and have the expected sign. Thus, the age and being married have a negative effect on the probability of region change, while living in a free housing has a positive influence. On the other side, with respect to the set of variables that affects the probability of migrating and are also included in the wage equations, it is observed, first, that people from less developed countries and more educated have higher probability of moving. Second, those individuals that, nowadays, are support technicians, operators, full time employees and their activity sector are construction, manufacturing or transport have more probability of having changed of region than the rest. Third, the estimates to log-wage models reflect, on one hand, the existence of positive wage differential for male, individuals from EU15 countries and with higher education. On the other hand, unskilled workers performing household activities have the highest negative wage differential. Finally, the estimates to the structural probit model reflect that the expected wage gain is a variable that exerts a positive influence on the interregional mobility. Therefore, it has been proved that geographical mobility of immigrants within Spain leads to a better allocation of resources in the Spanish labour market and contributes to increase the average wage in all the regions.

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