

# Network effects in hiring strategies\*

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(Preliminary version)

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## Abstract

This study provides some preliminary insights about the hiring policies at firm level concerning immigrants. In the most recent years, Spain experienced a huge entrance of immigrants and this entrance produced interesting effects on the structure of the local labor market. Rather than focusing on the study of the complementarity and substitutability between natives and immigrants, this analysis provides some evidence about to what extent the recruiting policies adopted for immigrants are driven by the social networks and the changes in the qualifications of the natives. We exploit the information at individual level included in the Muestra Continua de Vida Laborales (MCVL) for a period ranging from 1980 to 2008. By working with the sub-samples of high and low skill (hired) immigrants, we are able to isolate two basic effects: (i) hiring immigrants is strongly influenced by the presence of the stock of immigrants hired in the same firms, above all in the superior positions (such as managers), (ii) the hiring of high skill immigrants is also driven by the scarcity of natives with the same level of qualification of immigrants. Under this perspective, our study sketches a new alternative path to evaluate the assimilation of immigrants in the Spanish labor market.

**Keywords:** Education, Immigrants, Labor market, Natives.

**JEL CODE:** J21, J24, J61.

## 1 Introduction

" In 14 of the 25 largest metropolitan areas, including Boston, New York and San Francisco, more immigrants are employed in white-collar occupations than

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in lower-wage work like construction, manufacturing and cleaning.[...] Economic growth in urban areas has been clearly connected with an increase in immigrants' share of the local labor force.[...] Surprisingly the analysis showed, that the growing cities were not the ones, like St. Louis, that drew primary high-earning foreigners.[..] Rather, the fastest economic growth between 1990-2008 was in cities like Atlanta, Denver and Phoenix that received large influxes of immigrants with a mix of occupations-including many in lower-paid services and blue-collar jobs."

Source: The New York Times, April 15th 2010.

The economic impact of immigrants in host countries is a controversial issue. The principal debate develops around two positions. On the one hand, according to Borjas (2003), the US experience allows for assessing that there exists a clear substitution (competition) effects between natives and immigrants: immigration reduces unskilled natives' real wages. Entrepreneurs perceive immigrants more flexible and less costly than natives for job positions, and therefore they usually prefers the former to the latter for filling up the opening positions. On the other hand, Peri and Sparber (2009), recovering some previous studies developed by Peri and coauthors, assess that US census data demonstrate that immigrants specialize in occupation intensively in manual skill while natives in communication-language tasks. Their argument arises from a simple transformation of a basic trade-specialization model whose principal results is the complementarity between these two categories of workers. Nevertheless, one can argue that these outcomes rely on a specific job market (the US) and they might not hold for other countries where market conditions are structurally different.

In the wake of the previous approaches, various studied have been produced at national levels: Bratsberg and Raaum (2010) for Norway, Dustman and others (2010) for Germany and United Kingdom or Amuedo-Dorantes and de la Rica (2008) for Spain. They all investigate this complementary-skill relationship between natives and immigrants with respect to job position, but, in our opinion, the most challenging results refer to the Spanish environment. As well described in Amudeno-Dorantes and de la Rica (2008) the entrance of immigrants in Spain has been impressive in the last decade. At the end of 2008 immigrants represented 10% of the population: a unique record. Hence, it is worth deserving some attention to the analysis of the impact of immigrants on the Spanish host market. The clear evidence found by Amudeno-Dorantes and de la Rica (2008) endorses the idea that immigrants are not perfect substitutes of natives: the intense immigration flows did not affect significantly the wage of natives. On the contrary, immigration seems to have affected the distribution of jobs across natives. Funding on a standard comparative advantage effects, the (most skilled) natives shifted towards the no-manual skills, leaving the most manual

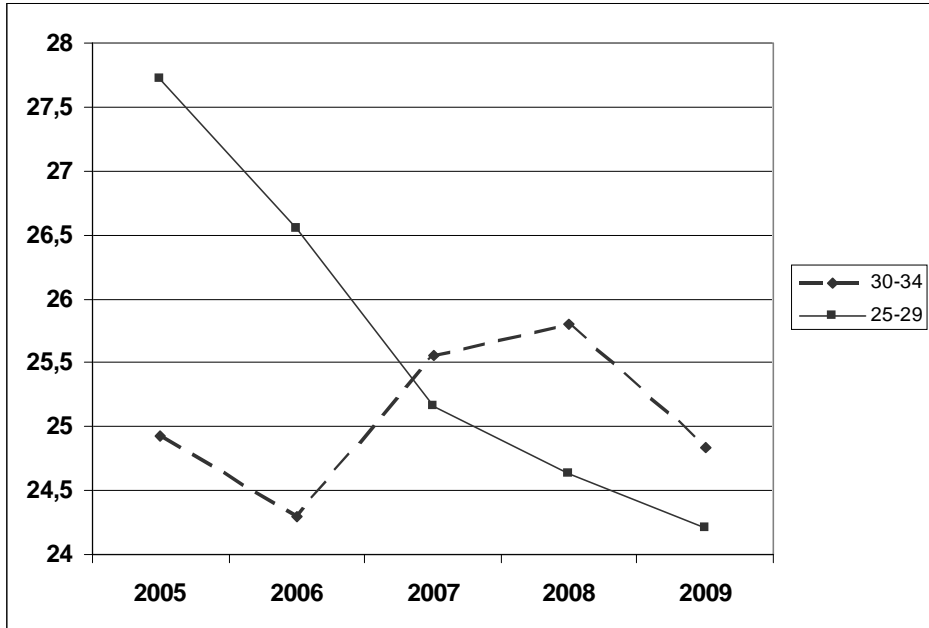


Figure 1: Proportion of young Spanish natives with a graduate degree (Source EPA, Calculus: Authors).

tasks to immigrants, with naturally an important component of gender composition in this occupation movement. Put differently, the entrance of more manual skill immigrants allow native-women for searching for a job according to her educational degrees and outsourcing the conventional home-tasks. As a consequence of this movement, we should expect that during the last decade Spain is experiencing a sensitive increase of natives coursing superior degrees

Nevertheless, when comparing these results with the educational performance of Spanish citizens in the 2000s (as in López Mayan, 2010, for instance) we find some puzzling results. The Figure 1 depicts an interesting evidence: the proportion of young people that complete graduate studies (i.e. at university level) drop impressively from 2005 to 2009.

Working on data about the post-compulsory education of Spanish young persons, López-Mayan (2010) assesses that the Spanish wage structure in 2006 discourage post-compulsory attendance. The shortage of skill natives should not leave unaffected the dynamics process described by Amudeno-Dorantes and de la Rica (2008): without the presence of a stock of skill-native workers the shift dynamics might not take place. If so, what could be the consequence for the labor composition of the Spanish labor market ?

This analysis aims at providing some further insights in order to interpret the potential

impact on the labor market composition issued by the shortage of qualified natives when receiving abundant flows of foreign workers. Our starting point is the canonical framework of reference for the interaction between natives and immigrants, with further elements embedding the external effects of a shortage in the stock of skill natives (in the spirit of Coles and Petrongolo (2008)).

Therefore, this paper addresses a second-degree question about the complementarity and substitutability between immigrants and natives. In order to understand the potential impact of the lack of qualified workers, we are focusing on two principal working questions:

a) Are natives progressively losing participation in the high-qualification positions of the Spanish job market ?

b) Do a stable presence of an immigrant in the managing position in a firm favour the hiring of other workers of the same nationality (both with similar and different qualification)?

It is quite likely to expect that the shortage of skill workers among natives should favor the recruitment of skill immigrants for such positions. If so, we cannot but considering another important consequence in the composition of the labor force entailed by the network effect: immigrants managers are more prone to hire workers belonging to the same ethnic groups. This is the canonical consequence of the network effects that has been already studied by Åslund and others (2009) for the case of Sweden and Goel and Lang (2009) for the case of Canada. However, our setting includes a further selecting features that has not been taken into account in the two previous studies: the stock effect.

We exploit the information at individual level included in the *Muestra Continua de Vida Laborales (MCVVL)* for a period ranging from 1980 to 2008. In these years, Spain hosted a progressively increasing number of immigrants with different origin. The most representative group is that of individuals born in Latin countries and the European ones. By working with the subsample of high and low skill (hired) immigrants, we are able to isolate two basic effects: (i) hiring immigrants is strongly influenced by the presence of the stock of immigrants hired in the same firms, above all in the superior positions (such as managers), (ii) the hiring of high skill immigrants is also driven by the scarcity of natives with the same level of qualification of immigrants. Under this perspective, our study sketches a new alternative path to evaluate the assimilation of immigrants in the Spanish labor market. It is not just a matter of complementarity or substitutability among the two groups, but we can think of a third intermediate situation.

The remaining is organized as follows. Section 2 introduces a brief theoretical framework that is useful to understand the economic factors backing our study. Section 3 presents a few empirical evidence and statistical data about the dataset we are exploiting, while Section 4 includes the econometric results. Finally, Section 5 concludes.

## 2 The theoretical framework

The theoretical background we consider as potential reference for our empirical analysis inspires to the searching-matching tradition. Conversely to the standard framework, we are introducing various simplifications to fit the framework to our specific environment. We focus on the workers who enter for the first time into the job market. In the canonical matching model proposed by Pissarides (2000), the author discriminates among the group of unemployed and job seekers. In our approach we are skipping all the discussion associated to the productivity effect, the effort to find a job as well as the reservation wage. It is very important to keep in mind that we are considering a labor market with very rigid institutions. In Spain, almost all contracts are defined after a collective bargaining; then there is no room for productivity to play the discriminatory role as in the canonical framework. Another empirical evidence support our statement: working with the information included in our database we can establish that just 20% of workers voluntarily leave their job for a better position. The most frequent causes of job departure are associated with the end of the contract (temporary contracts are very diffused).

To this extent, the data we dispose can be perfectly assimilated to the outcome of a matching function with a unique group of individuals. Let us define our matching technology as

$$m(U, V),$$

where  $U$  refers to a general job seeker and  $V$  to a general vacancy. Even if the market institution are very rigid, we cannot take for granted that a workers accept any job he finds: job seekers are likely to accept the job whenever it matches with their qualifications. Hence, we still consider the probability of accepting a job as a function of their qualification, and, in doing so, we recover the dynamics of the productivity bound of the canonical model. Therefore the probability of accepting a job is a function of the individual qualification degree ( $\alpha_i$ ) and the workers fill the open positions if and only if the level of qualification required in the official job advertisement ( $\alpha$ ) is below their own degree (namely,  $\alpha_i \geq \alpha$ ). Then, this probability take the form of  $[1 - G(\alpha_i)]$ . In the canonical standard model, the probability densities rely on the individual productivity that are completely independent from the number of workers and the number of jobs. In our setting, this condition is not fulfilled: our density probability depends on the individual educational degree and that required by the job. This condition is not totally independent from the number of persons carrying a specific degree. If a firm requires a given professorial qualification for a job, it will first try to hire persons with the qualification as high as possible. If it does not succeed in achieving this objective, it will revise its requirements and, maybe, downscale the requirements.

Therefore, this dynamics influence a given individual transition probability. In the same spirit, Coles and Petrongolo (2008) assess that other effects can impact the transitional path of a worker passing from unemployment to employment; for instance networks effects. In their view, in the matching process the stock matters. If most matches originate in the stock, a large increase in the number of matches must result in a reduction of the stock size. They prove that the average re-employment rate is driven by the inflows of new vacancies; the crowding out by the unemployment stock implies that the average re-employment rate is independent of the distribution of search efforts. Hence the re-employment function can be represented as:

$$\lambda = \frac{1}{f(G(\alpha_i))} m(U, V).$$

Adopting this kind of framework for understanding the dynamics in the Spanish labor market driven either by the education and education effects, we approximate the probability (for a job seeker) to get an employment with the some measure of ethnic network effects at the level of firms and its educational degree. The shortage of native job seekers with the highest educational degree are expected to make the educational degree a discriminatory feature favouring the hiring of foreign born workers at the highest positions. In the same way, the network effect inside each ethnic group should again favor a the hiring of immigrants (rather than natives) when the managers of the firms are foreign-born too.

In our exercise, we are also aiming at understanding to what extent these effects are more intense in specific group of firms such as the small size firms, or firms in specific sectors of production.

### 3 Empirical evidence

The *Muestra Continua de Vida Laborales (MCVL) database* was released in 2004. It includes workers are a random sample of whom are affiliated to the Social Security in the year when the survey was extracted, and reproduces the labour history of the affiliated starting from their first job. The MCVL is a large dataset consisting of workers matched to their establishment of employment. This database has some limitation: attrition because we do not observe workers when they go out of the labour market, we do not know when immigrants arrive in Spain for the first time and their previous labor experience, and, also, since a part of immigrants are illegal, no information are available for that group.

Although this limitation, the MCVL is a good database for studying the Spanish labour market. Another database that is frequently used is the EPA (Labour Force Survey). The MCVL is complementary to the EPA because it gives more exhaustive information on the labor trajectory of workers; besides the MCVL contains information about the amount of

contribution to the Social Security System, which is a good approximation at the wage of workers.

This data set gives information about all the historical relationships of any individual with the Social Security System (in terms of work and unemployment benefits). We also have information with respect to the type of contract, the sector of activity, the qualification and the earnings that every month an individual must pay to the Social Security System, the date when entering or going out of the job market, the part-time or the full-time contracts and the size of firm. Moreover, it contains information on the gender, the nationality, the residence and the date of birth and the level of education for each individual. In addition the MCVL provides also information about the establishment (location, number of workers, industry and sector) in which a worker is hired. The data allow us to track managers, employees and establishments over time. In the MCVL we extract information concerning workers as employee and without taking into account the special regimes (self-employer, ...).

In the *MCVL* we are selecting the firms (that are active in 2008) with at least 4 employee. We restrict our analysis to firms with less than 50 employee with minimum 4 workers employed because in this case is more likely that the manager has the power in the hiring and firing employees. We eliminate firm created in 2008 or out of the market in 2008. Therefore, we operate a selection of new hires for the each establishment from 1980 to 2008 using the wave of 2008 of MCVL. Matching workers and establishments is difficult because the MCVL born as a data to control just employees, but inside the data we have also the identification of the firms, that help us to organize this part of the information. Once obtained such a sample, we are selecting the number of individuals (legal immigrants) that kept a position in the same Spanish firm for at least two years. Then, we can track the evolution of the recruiting policy followed by the firm since the entrance of such individuals onward. Some preliminary descriptive statistics help to define the terms of the problem we are focusing on.

We define immigrants by country of birth, and we contrapose them to natives.<sup>1</sup> There is a high variance across the type of contracts offered to immigrants. Immigrants are usually enjoying temporal contracts with a high turnover among firms. By discriminating according to nationality, immigrants from China and Romania record the lowest level of turnover (probably because they are more likely to run their own private business rather than being hired as employees), while workers from the rest of Eastern European countries (above all Ukrainian) and from the Latin America are recording the highest rate of temporary jobs (Figure 2). We define a manager in a establishment according to his qualification by

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<sup>1</sup>Although the immigration in Spain is quite heterogeneous, we can isolate three big groups: Latin, Europeans and Africans.

following the definition of García (2008), i.e. managers are workers that have a qualification between 1-3, while the other workers are other hiring (native or immigrants), with middle qualification(4-6), middle-low qualification (7-8) and at the end low qualification (9-10).

In Table 1 we report the descriptive statistics about native and immigrants by gender included in our sample. Overall, we have 167064 entries, whose 155427 are natives and 11637 immigrants. Immigrants are younger than natives and, on average, less educate. The education variable is quite sensitive in this database because is not update by Social Security but from another source (Padron). If we compare the value of this variable in the MCVL with the value in the EPA, we find that the values for each level of education are lower (see García, 2008). Both natives and immigrants work in small firm (66%) with a low qualification. Most of immigrants are concentrated in regions such as Catalonia and Madrid and work in the construction or hotel and restaurant sectors, while natives are most in the industry sector.

Focusing on the composition of the workforce of all the firms belonging to our sample, and selecting exclusively the high qualified positions (in 3, the group 1-3), we are recording an interesting evolutionary trend. The percentage of natives filling up these positions monotonously dropped from 95% in 2001 to 81% in 2008. At the same time, in 2008, the percentage of immigrants filling up these positions increased. For the lower qualification a clear convergence trend between the two groups takes place (Figures 3 and 4).

European workers account for (about) 0.8% on average by group (according to their nationality), while workers from various countries of Latin America achieved 2% (on average) by group. This second group basically doubled their participation in the Spanish labor market (at this qualification level) passing from 2001 to 2008 (Figure 3).



Table 1: **Descriptive statistics for natives and immigrants**

(Source: MCVL 2008, Calculus: Authors)

	Native		Immigrant	
	Men	Women	Men	Women
Age	38.55	35.67	37.22	36.80
Less Primary Educ	0.21	0.15	0.26	0.18
Less Sec. Educ	0.37	0.30	0.33	0.31
Second. Rduc	0.29	0.35	0.29	0.37
Graduate	0.11	0.19	0.10	0.13
Micro-size firm	0.24	0.23	0.24	0.23
Small size firm	0.66	0.66	0.66	0.66
Middle size firm	0.10	0.11	0.10	0.11
Low qual.	0.71	0.70	0.84	0.83
Middle qualif.	0.11	0.07	0.07	0.06
High qual	0.17	0.22	0.09	0.11
Regions				
Catalonia	0.17	0.19	0.23	0.23
Madrid	0.15	0.16	0.22	0.23
Murcia	0.02	0.02	0.03	0.02
Valencia	0.10	0.10	0.11	0.10
Andalucia	0.18	0.16	0.09	0.07
Agricult.	0.01	0.00	0.01	0.00
Industr.	0.17	0.08	0.13	0.06
Construc.	0.21	0.04	0.24	0.02
Hotels and Rest.	0.09	0.12	0.19	0.31
Nationality				
North Europ.			0.13	0.15
East Europ			0.09	0.10
Spanish			0.31	0.37
African			0.20	0.07
Asian			0.04	0.01
South American			0.21	0.27

According to the current literature (Amuedo-Dorantes and de la Rica, 2008), but also the common perception, immigrants from Latin America are filling up job positions at the lowest degree of job qualification. Then, this group of immigrants is perceived as the biggest threat for native-no-qualified workers. Nevertheless, our evidence claims that we have an relative important group of immigrants that are occupying qualified positions.

Two possible explanations come to the mind for understanding this figure:

1. In 2005/2006 the Spanish government approved a reforms for speeding the recognition of foreign degree and make foreign citizens more suitable to be hired for the position

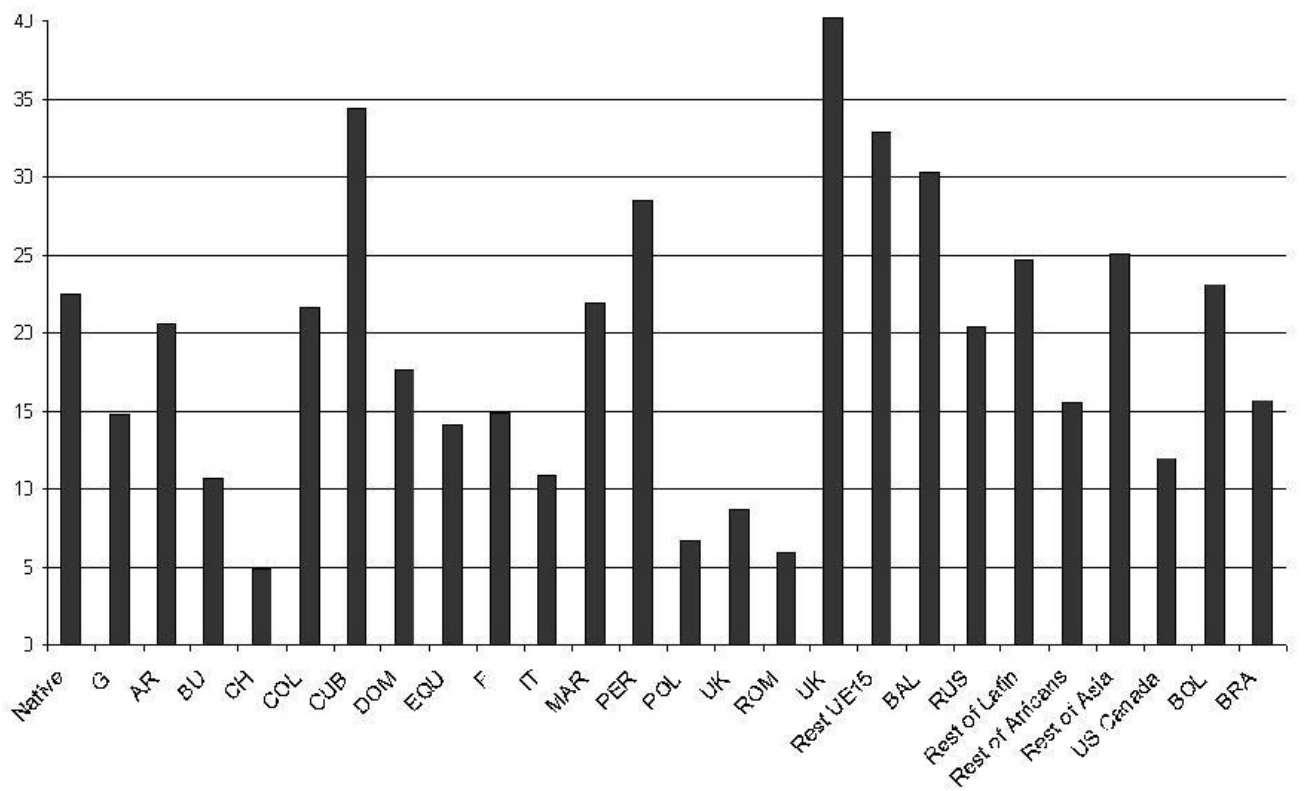


Figure 2: Average of spells by country of birth. (Source: MCVL 2008, Calculus: Authors).

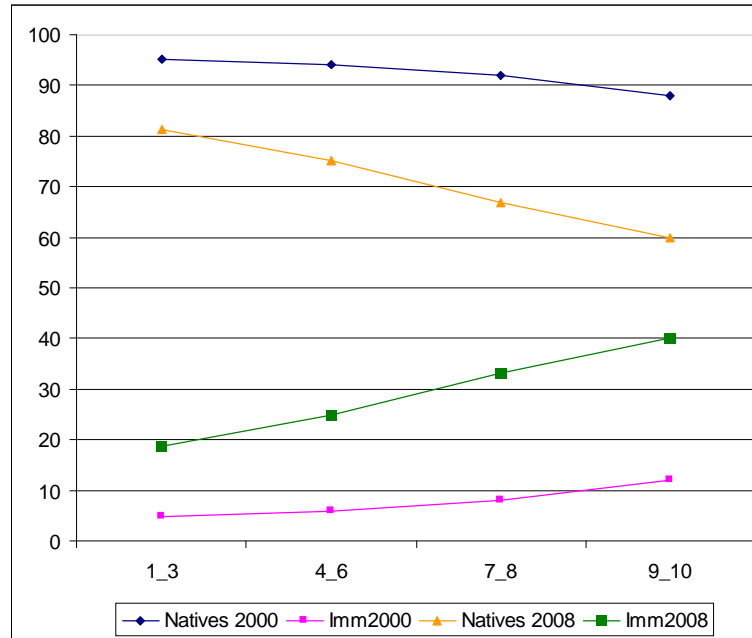


Figure 3: Spanish labor force composition in 2000 and 2008. (Source: MCVL, Calculus: Authors).

matching their educational degree. At the same time, we may want also to take into consideration the educational problems suffered from Spain in the middle of 2000s: the easy job opportunities gave a strong incentive for entering into the labor market before (or rather than) achieving a graduate degree (refer Figure 1).

2. Jointly with the previous event, there is a clear guess about the cultural and language proximity between natives and Latins for increasing the participation of the last group in the Spanish labor market at the highest degree. This is a reasonable explanation thinking of the kind of expected tasks for these positions: managers and other directives are expected to communicate frequently (daily) with the other workers in the enterprise and language fluidity is strongly recommended. This would explain the preference for Latin directives rather than the European ones.

## 4 Econometric results

One of objective of this study is to find to what extent social networks may have an impact in recruiting policies at firm level. Same culture, language or relationship make that probability to hiring people with ethnic similarity between managers and workers is higher. There are many explanations such as: preference among agents (Becker 1957), managers that can

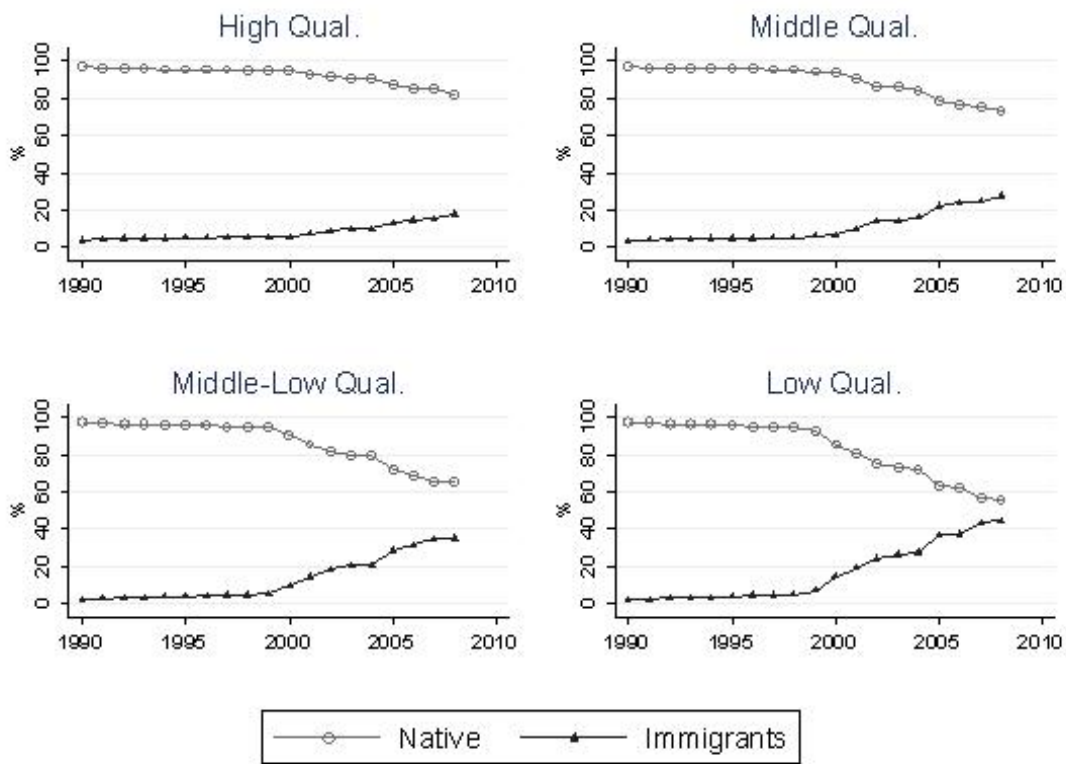


Figure 4: Hiring of natives and immigrants by qualification. (Source: MCVL, 2008, Calculus: Authors).

evaluated better some characteristics (level of education, experience, etc.) due to share them or/and network across workers.

Some descriptive due on the MCVL database in 2008 help to introduce the analysis we run. In Figure 5 we compare the immigrant-managers and immigrant-middle or low skill hired from 1980 to 2008. We can see how the percentage of hiring manager-immigrants is 8,15% of the total managers and just 2,07% on the total workers (see Table 2). On the contrary, the less qualified immigrants are about 14,98%. Several managers work in the hotels and restaurant, transport and financial intermediation sectors, very few in agriculture. Less qualified immigrants are employee in sector as agriculture, health, construction and hotels and restaurants. They presence is quite scarce in public administration. In Table 2, we summarize data about the total workers and, then, we separate between immigrants and natives according to their qualification. The percentage of immigrants hired by immigrants managers (23,61%) is large with respect to that of native managers (14,37%).

Table 2: **Descriptive statistics by natives and immigrants**

(Source: MCVL 2008, Calculus: Authors)

Manager origin	All	Native	Immigrants
Immigrants hiring	18678	16,746	1,932
	<i>14.98</i>	<i>14.37</i>	<i>23.61</i>
Manager Hiring origins	42360	38906	3454
	<i>25.36</i>	<i>23.29</i>	<i>2.07</i>
New Hiring Middle-Low qual.	124704	116521	8183
All obs	167064	155427	11637

In order to asses the impact of managers' origin on the origin of new hiring we are using a linear probability model:

$$Himm_{ijt} = \alpha Mimm_{jt} + x_{jt}\beta + \varepsilon_{ijt} > 0 \quad (1)$$

Where  $Himm_{ijt}$  is a binary variable that equal 1 if the new hiring  $i$  in establishment  $j$  in year  $t$  is an immigrants, and take value 0 otherwise.  $Mimm_{jt}$  is an indicator of origins of the managers and  $x$  is a vector of characteristics of new hiring (age, level of education, qualification, sector, industry, regions, nationality). In tables 3-5 we report our

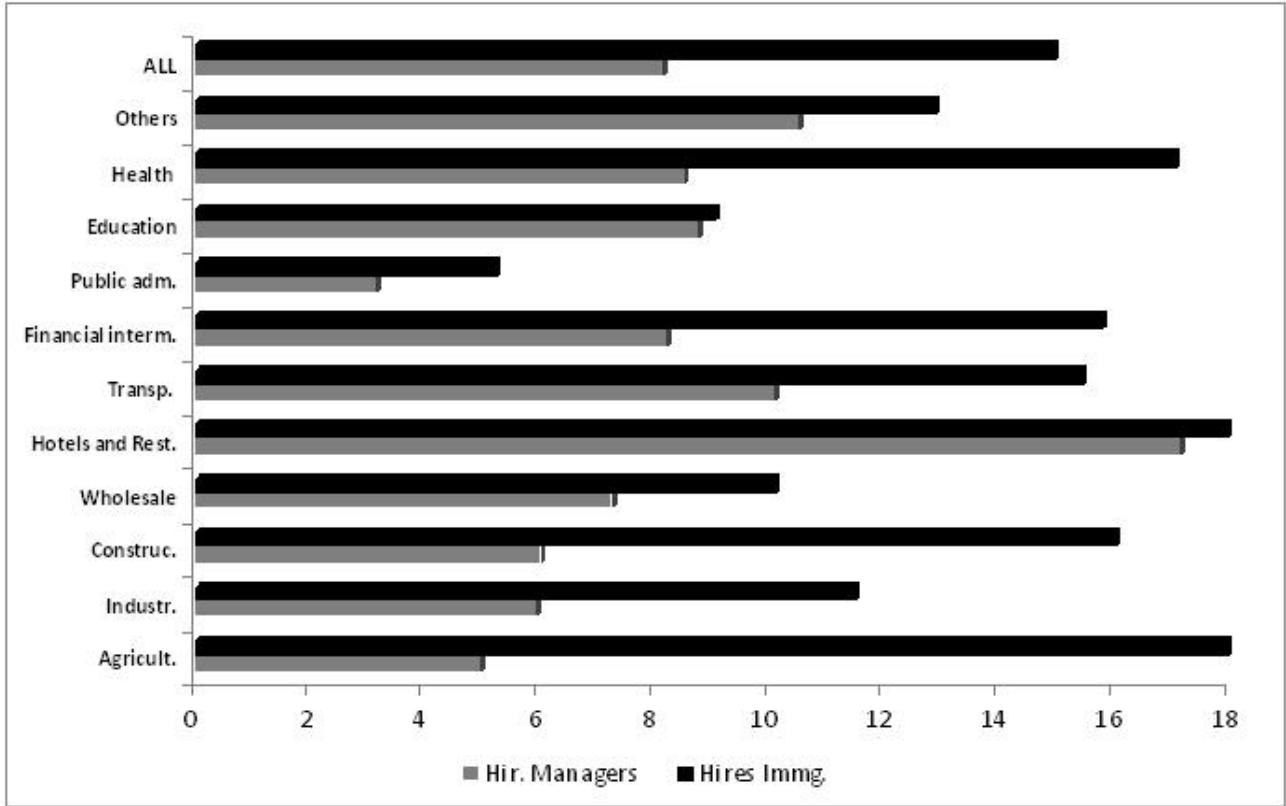


Figure 5: Immigrant managers and immigrant hiring by industry. (Source: MCVL, 2008, Calculus: Authors).

estimations. We generally find a positive and significant correlation between immigrants hiring and immigrants managers.

[Box 1 about here]

[Table 3 about here]

[Table 4 about here]

[Table 5 about here]

Our exploratory analysis of the network effects in hiring policies begin with the application of a simple probit model. We perform different specification for identifying the most suitable combination of factors that can explain the hiring policies in Spain. We are working on a limited version of the MCVL that allows for considering firms hiring immigrants from 1980 onward. As our purpose is to emphasize the decision capacity of a manager in hiring decisions and, hence in preferring immigrants rather than natives if he is an immigrant too, we select hiring firm with less than 50 employees. In doing so, we are aiming at isolating the

firms in which the managers is expected to have a more direct (and possibly independent) decision authority in hiring strategies.

Table 1 includes the results when we consider the full sample and the subsample of low skill (hired) immigrants. The legend of the variable we are adopting is presented in Box 1. When we consider the full sample, the hiring policies meets the expectations: we clearly find the inverted U-shape of the age of hiring. The sector and geographic fixed effects are quite often statistically significant; this means that the positions filled up by immigrants often have a specific connotation in a few sectors and the ethnic origin of immigrants matters. As we were expected the probability of hiring a immigrants is directly proportional of the relative density of immigrants (with respect to natives) as well as their degree or qualification. However, as usual with cross sectional data, the analysis performed with the whole sample masks other interesting individual effects that we can select by looking at the different subsamples.

Still in Table 1, we provide estimations for the subsample of low skilled (hired) immigrants. Three main features pop up when working with this subsample: (i) the ratio immigrants/natives negatively affects the probability to hire a low skilled immigrants, (ii) tiny firms (i.e. firms with less than 9 employees) are less likely to hire a low skilled immigrant, but (iii) there is a positive and statistically significant likelihood that a low skilled immigrant is hired in a firm whose manager belongs to the same ethnic groups. The last column of the same table proposes an alternative specification in order to check the robustness of the results we got, but it is not more informative than the second column.

Therefore, when considering the low skill immigrants subsample, it is clearly evident that the network effect is significant and this may be the reasons that those firms prefer an immigrant to a native given that the hiring decisions is not simply driven by the scarcity of natives for those positions.

When turning to the high skill immigrants, the correspondent results follow the same dynamics. Once more, the network effect matters: the probability to hire a high skill immigrants is directly proportional to the stock of high skill immigrants already hired in the firm. Once more, on average, the small firms are not very prone to contract immigrants, but, in this subsample, the relative density of immigrants to natives turns out to have a positive effects on the probability to hire a high skill immigrants. Behind this result, one can somewhat detect a sort of substitution effects between (high skill) immigrants and natives. If natives become scarce for filling up all the available positions, then, the entrepreneurs pass to hire high skill immigrant workers.

In order to asses this last hypothesis, we run to further estimation for the subsample of high skilled immigrants and whose results are included in Table 5.<sup>2</sup> In this table we

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<sup>2</sup>This last estimations are run with a reduced sample (2005-2008) because of limited availability of data

focus on exploring some issues concerning the network effect. We privilege the introduction of some independent variables that take into consideration the variation of the stock of qualified natives (with respect to immigrants) as potential effect in influencing the hiring strategies towards immigrants. As for the low skill immigrants, the network effect is still very important for hiring an immigrants. However, it is a evident and strong results that the probability to hire a high skill immigrants is positive associated with the scarcity of qualified young natives. We capture this effects with a direct variable (the ratio of young educated natives and the whole educated natives) as well as with an interaction term. In addition, we also find that the probability of hiring a high skill immigrants is proportional to the proportion of young natives as a percentage of the total population. This last finding turns out to be in line with the empirical evidence discussed before: the lack of qualified young workers among natives yield a more intense hiring effect in the group of high skill immigrants.

## 5 Conclusions

This study provides some preliminary insights about the hiring policies at firm level concerning immigrants. In the most recent years, Spain experienced a huge entrance of immigrants and this entrance produced interesting effects on the structure of the local labor market. Rather than focusing on the study of the complementarity and substitutability between natives and immigrants, this analysis provides some evidence about to what extent the recruiting policies adopted for immigrants are impacted by the social networks and the changes in the qualifications of the natives. Our preliminary estimations assess that the networks effects matter for hiring policy for immigrants. The presence of an immigrant as a manager of a firm is evaluated as a positive and important factor for further hiring inside the groups of the immigrants. However, when turning to consider the subsample of high skill immigrants, such a network effect is complemented by the relative scarcity of natives with the same qualification of immigrants. Hence, the probability to find an immigrant fulfilling a qualified position in the firm is basically associated with two effects: the possible presence of other qualified immigrants in the same firms, and the shortage of natives with the same kind of qualifications. Under a policy viewpoint, these results proposes an alternative perspective to consider the impact of immigration over the Spanish labor market. Immigrants cannot be considered just as persons hired for low skill occupations allowing natives to shift toward the highest ones. They also are present in the high skill positions because natives stop coursing graduate studies. We need to perform additional robustness check about this outcome, but, however, we could anticipate some considerations concerning the

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about education.



optimal reaction of natives. They cannot but thinking of putting more effort for coursing graduate and post-graduate studies either for improving their productivity and increasing their chances to get employed at the highest levels. Maybe, the current stagnation of the Spanish labor market can provide a further incentive for moving in this direction.

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### Box 1: Description Variables

age	Age of the hired person
age2	Square of the age of the hired person
ratioimm	Ratio between hired immigrants and natives
edu1	Maximum degree lower than primary education
edu2	Maximum degree primary education
edu3	Maximum degree secondary education
edu4	Maximum degree graduate education
edu5	Maximum degree post-graduate education
naceurope	Nationality of immigrants: North Europe
naceuropeast	Nationality of immigrants: East Europe
Spain	Nationality: Spain
Africa	Nationality: Africa
Asia	Nationality: Asia
South America	Nationality: South America
Agric.	Sector of activity: Agriculture
Industry	Sector of activity: Industry
Construction	Sector of activity: Construction
Trade	Sector of activity: Trade
Hotels	Sector of activity: Tourism
Transport	Sector of activity: Transport
Finance	Sector of activity: Banking and Finance
Public Admin	Sector of activity: Public Administration
Education	Sector of activity: Education
Health	Sector of activity: Health services
Aver. Training	Level of training of the hired person: average
Low Training	Level of training of the hired person: low
HighTraining	Level of training of the hired person: high
Firm size (<9 empl)	Firm size (tiny)
Firm size (9-49 empl)	Firm size (small)
Nation. Manager hiring firm	Nationality of the managers in the hiring firm
Stock imm manag. firm	Stock of immigrant managers hired in the hiring firm
Ratio natives high educ (20-29) over (20_59)	Ratio between educated natives (20-29) and educated natives (20-59)
Ratio (20-29) natives over pop	Proportion of the educated natives (20-29) in the total population
Ratio (20-59) natives over pop	Proportion of the educated natives (20-59) in the total population
[Ratio natives high educ (20-29) over (20_59)]*Educ4	Interaction term

**Table 3: Econometric Estimations**

Method: PROBIT

VARIABLES Dependent Variable	All sample Prob. hiring		Low skill Immigrants Prob. hiring		Low skill Immigrants Prob. hiring	
	coef	se	coef	se	coef	se
age	0,075***	0,004	0,072***	0,004	0,078***	0,005
age2	-0,001***	0,000	-0,001***	0,000	-0,001***	0,000
ratioimm	0,653***	0,020	-0,169***	0,059	0,847***	0,024
edu1	-0,208***	0,062	-0,102*	0,058	-0,171***	0,065
edu2	-0,133**	0,061	0,144**	0,059	-0,110*	0,064
edu3	0,161***	0,061	0,087	0,062	0,202***	0,064
edu4	0,086	0,065	-0,163	0,166	0,169**	0,069
edu5	0,351***	0,116			0,045	0,184
naceurope	-0,359	0,228	-0,571**	0,223	-0,358	0,234
naceuropeast	0,124	0,245	0,148	0,241	0,139	0,249
Spain	-3,885***	0,219	-4,118***	0,215	-3,840***	0,222
Africa	0,528**	0,256	0,499**	0,248	0,559**	0,259
Asia	0,200	0,329	0,213	0,322	0,203	0,333
South America	0,637**	0,259	0,657**	0,255	0,653**	0,262
Agric.	-0,251**	0,125	-0,122	0,120	-0,173	0,135
Industry	-0,143***	0,034	-0,144***	0,033	-0,089**	0,037
Construction	-0,176***	0,033	-0,058*	0,032	-0,146***	0,036
Trade	-0,041	0,034	-0,095***	0,033	-0,010	0,037
Hotels	0,012	0,031	0,327***	0,031	0,013	0,034
Transport	-0,122***	0,045	-0,025	0,044	-0,102**	0,048
Finance	-0,091***	0,031	0,059*	0,030	-0,076**	0,034
Public Admin	-0,225***	0,041	-0,277***	0,039	-0,166***	0,044
Education	0,098**	0,046	-0,116**	0,045	0,136**	0,054
Health	0,137***	0,041	0,122***	0,040	0,169***	0,046
Aver. Training	0,152***	0,037	-0,101***	0,038	-0,067	0,044
Low Training	0,490***	0,029				
Firm size (<9 empl)	-0,046*	0,025	-0,075***	0,025	-0,036	0,027
Firm size (9-49 empl)	-0,008	0,023	-0,022	0,022	0,012	0,024
Nation. Manager hiring firm			0,008***	0,001	-0,000	0,002
_cons	0,250	0,243	0,868***	0,237	0,519**	0,248
Pseudo R <sup>2</sup>	0,56		0,57		0,57	
Obs	92718		79116		79116	

\*\*\* p&lt;0.01, \*\* p&lt;0.05,\*p&lt;0.1

**Table 4 Econometric Estimations**

Method: PROBIT

VARIABLES Dependent Variable	High skill immigrants		High skill immigrants	
	Prob. hiring		Prob. hiring	
	coef	se	coef	se
age	0,074***	0,014	0,072***	0,009
age2	-0,001***	0,000	-0,001***	0,000
ratioimm	0,242***	0,039		
edu1	-0,755***	0,237	-0,313	0,206
edu2	-0,504**	0,223	-0,138	0,198
edu3	-0,427*	0,220	-0,007	0,195
edu4	-0,557**	0,221	-0,113	0,196
edu5	-0,056	0,249	0,278	0,210
naceurope	-3,904***	0,398	-4,470***	0,427
naceuropeast			-4,142***	0,571
Spain	-7,655***	0,367	-7,967***	0,412
Agric.	-0,596	0,388	-0,180	0,243
Industry	-0,403***	0,098	0,040	0,069
Construction	-0,249***	0,089	0,060	0,068
Trade	-0,107	0,093	0,258***	0,068
Hotels	0,054	0,088	0,269***	0,071
Transport	-0,162	0,129	0,085	0,102
Finance	-0,078	0,083	0,142**	0,059
Public Admin	-0,423***	0,113	-0,185**	0,082
Education	-0,041	0,092	0,076	0,059
Health	0,036	0,090	0,088	0,066
Aver. Training	-0,063	0,048		
High Training			0,071**	0,034
Firm size (<9 empl)	-0,072	0,072	0,043	0,035
Firm size (9-49 empl)	-0,125**	0,063	0,013	0,052
Stock imm manag. firm			0,187***	0,009
_cons	4,796		4,424***	0,499
Pseudo R <sup>2</sup>	0,33		0,37	
Obs	13362		21896	

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \*p&lt;0.1

**Table 5: Econometric Estimations**

Method: PROBIT

VARIABLES Dependent Variable	High skill immigrants		High skill immigrants	
	Prob. hiring		Prob. hiring	
	coef	se	coef	se
age	0,092**	0,043	0,219***	0,084
age2	-0,001	0,001	-0,002**	0,001
Industry	-0,017	0,340	0,887	0,643
Construction	-0,179	0,271	0,698	0,577
Trade	0,359	0,321	0,375	0,715
Hotels	0,749	0,458	1,608**	0,764
Transport	-0,162	0,450	0,581	0,780
Finance	-0,017	0,244	0,904*	0,534
Public Admin	-1,066**	0,424	-1,319	1,646
Education	-0,326	0,243	0,245	0,534
Health	-0,910***	0,313	-0,297	0,671
High Training	-0,453***	0,159	-0,336	0,241
Firm size (<9 empl)	-0,299	0,235	0,058	0,442
Firm size (9-49 empl)	-0,160	0,184	0,296	0,358
Nation. Manager hiring firm	0,066*	0,035	0,107*	0,063
Ratio natives high educ (20-29) over (20_59)	-37,959**	17,744		
Ratio (20-29) natives over pop	432,500**	207,800	318,839***	113,594
Ratio (20-59) natives over pop	-164,876	162,347		
[Ratio natives high educ (20-29) over (20_59)]*Educ4			-22,106***	6,554
_cons	9,719	23,294	-20,997***	6,275
Pseudo R <sup>2</sup>	0,13		0,65	
Obs	643		638	

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1