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recruitment and internal promotion.

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Staffing strategies in SME's: determinants of external recruitment and internal promotion

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ABSTRACT

The purpose of this paper is to examine the determinants of use internal or external labour market to fill a firm vacancy in SME's taking into account the differences existing among blue and white collar jobs. Following different theories we can identify three main reasons for use internal candidates rather than external ones- firm specific knowledge, adverse selection problems and motivation-. However, there are others factors that might affect this choice but the last theories don't take into account. In this paper we try to shed some light on what are these other factors that may affect firm decision to use internal or external labour market. Particularly we analyses the relationship among new technologies, innovation activity and firm location on the staffing strategy. The results shows difference behaviour on the decision to fill a vacancy using internal or external labour markets between manufacturing and service firms, and this decision depends not only on firm internal characteristics, like technological complexity or innovation activity, but also on firm location. The results also support the hypothesis of ports of entry especially in the manufacturing sector.

JEL Classification:

I. Introduction

How to fill a vacancy is an important managerial decision, affecting both the future performance of the firm and also individuals career advancement. In the event of a job opening, the employer can either promote internally a current employee into the job, or hire a new worker from the external labor market. This is an excellent time to ensure firms are recruiting for the skills they need. Initially, from a simple market type of reasoning, one could argue that external recruitment should be more efficient as the pool of potential candidates is wider, hence the probability to find the correct worker is higher. There is, however, consistent evidence that internal promotion is a widespread practice.

Several theoretical explanations have been developed to explain why firms would promote from among incumbent workers rather than recruit externally in filling higher positions. A first reason, and perhaps the most often cited, is the importance of specific human capital (Becker, 1964; Gibbons and Waldman, 1999). When part of the human capital needed to perform in the workplace can only be developed inside the firm, both the employer and the employee have incentives to maintain a long-term relationship. From the point of view of the worker, because of problems of appropriation, they must have a signal that their investment in developing those skills will pay off. Employers enforcing promotion rules would provide such a credible signal (Carmichael, 1983; Prendergast, 1993). From the point of view of the employers, if firm specific human capital is important, it may be very difficult (specially for the higher ranks of the hierarchy where the accumulated level is very high) to find an external candidate who could outperform an existing worker, or otherwise be very expensive if training has to be provided. The second theoretical explanation put forward is related to learning models (Farber and Gibbons, 1996). The basic idea is that the abilities, motivation and performance of existing workers can be observed with more precision than those of external candidates. Because of adverse selection problems (Greenwald, 1979) risk-averse employers may prefer reduce uncertainty and promote an adequate internal candidate. Finally, as the tournament theory point out, we can analyze the decision of promoting internally as a mechanism to provide incentives to work hard, particularly when the cost of monitoring workers' effort is high (Lazear and Rosen, 1981; Chan, 1996). Following these theoretical explanations employers only prefer to recruited externally rather than promote an incumbent worker only when an external candidate shows a significant margin of superiority.

Unfortunately, as Bayo and Ortin (2006: 452) point to, these rich and suggesting theoretical developments have not been matched with a similar quality and quantity of empirical work. Our paper expands the literature on the determinants of staffing strategies in two directions.

First, we carefully consider the relative opportunity costs of each of the two practices. On one hand, internal promotion depends on the match between the required characteristics of the job openings and those of incumbent workers; but, on the other, the specific location of the firm will determine the probability of finding workers with the right skills outside the firm. The balance between the internal “strength” of the workforce and the availability of top quality candidates in the external labor market will set a relative price for each strategy. Furthermore, the location of the firm not only has an effect in terms of the number of potential candidates, but also on the information about the characteristics of all employees in that area. When the firm is located in high-density markets (measured by the number of competing or similar firms) the fluidity and quality content of information about workers abilities is higher, increasing the expected payoff (decreasing uncertainty) of poaching strategies. This can have a dual effect on the decision to recruit externally or promote an incumbent worker. First, have more information about the characteristics of external candidates reduces the uncertainty of the selection process which reduces the adverse selection problems and increases incentives to recruiting externally. Second, greater flows of information higher the probability that other firms observe the skills of our workforce and thus higher the incentive to use promotion as a retention mechanism. In this sense, the literature on raiding has showed (Lezear, 1986; Bernhardt, 1995; Kim, 2007) that an employer may delay a worker’s promotion depending on the extent to which the revealed skills can be appropriated by other firms. Note, however, that this hypothesis heavily depends on the possibility to maintain the real worker ability unknown by competing firms until promotion is realized. If information is available before that happens, promotion may instead become a strategic movement by the current employer in order to keep a valuable worker under contract.

Our second contribution to the literature is related to the discussion on whether firms use internal or external labor market strategies to deal with technical and organizational change (Behaghel et al, 2008 and 2011). It has been claimed that skilled biased technological and organizational change is transforming the workplace moving away from routine tasks and becomes into analytical and interactive tasks and, therefore, changing the skills workers need to perform efficiently, (Caroli and Van Reenen, 2001; Spitz-Oener, 2006). Firms may react to this trend by dismissing workers with the “old” skills and incorporating new ones with the right

set of skills (Bauer and Bender, 2004). Alternatively, they can rely on their internal labor markets and invest in training to update their workers' skills (Behaghel and Greenan, 2005). In terms of the impact on the probability to use external or internal candidates to fill a vacancy, it is easy to see that the external strategy to deal with the changing skill requirements would be negatively correlated with promoting people, while the opposite would be observed when firms try to protect their investment in training.

In order to test the impact of firms' technological development and firm location on the probability to promote their workers, we use a unique data set on manufacturing and service Catalan SME's. This data set is interesting for several reasons. It covers the whole range of manufacturing and service industries in the economy, allowing for more general comments than when specific sector or even firm data is used. In addition, the empirical evidence available is mostly on large firms. SME's are supposed to behave differently in terms of promotion decisions from large firms for several reasons. Initially, developing internal labor markets is less costly in large firms but also there is some literature showing that workers in large firms have lower job satisfaction than in small firms because of differences in their work environment (for instance lower levels of autonomy and participation). Trying to compensate for poorer working conditions, employers in large firms, among other things, offer better promotion expectation (Idson, 1990; Idson and Oi, 1999 and García, 2008).

Our results show that for manufacturing firms the use of new technologies have different effects on the decision to fill a vacancy depending if this vacancy is in blue or white collar jobs. For blue collar jobs the use of new technologies increase the probability to use promotion especially if the firm is located in high knowledge areas, hence high technological firms located in high knowledge areas trend to use promotion for blue collar workers has a mechanism of retention to protect their investment in training. In contrast for white collar jobs, high technological firms trend to use more external candidates to fill a vacancy although this effect becomes not significant when we interact this variable with location variable. We also analyse the effect of innovation activity and the results shows that innovation activity have a positive relationship with the use of promotion as a mechanism to fill a vacancy in blue and white collar jobs although this relationship depends on firm location. If the firm is located in high knowledge areas the probability to use promotion to fill a blue collar job is reduced, and this could respond to a higher facility to find high skill workers in these areas, hence a reduction of the adverse selection problems. In the case of service firms, innovation activity and new technologies have a positive effect on the probability to recruit and external worker either in

blue and white collar jobs. Although in the case of blue collar workers that's only happens if those firms are located in high knowledge areas. Since you are high technological and innovative firms situated in low knowledge area is more difficult that other low technological or innovative firms can steal your worker, in the other case service firms needs to protect their invest in training. And in the case of white collar jobs only happens if those firms are located in low knowledge areas. High technological and innovative firms situated in high knowledge areas use a vacancy to acquire new thinking, skills and knowledge by hiring external workers.

Another important result is the positive relationship between the leader quality and the use of external labour market to fill a vacancy. Those firms with high qualified managers trend to fill the new job vacancy using external candidates. Finally, our results support the hypothesis of ports of entry, that's mean firms specific knowledge or human capital is more important for top ladder jobs.

The paper is organized as follows. The next section present a detailed description of the variables used in the analysis. The third section provides a detailed description of the data set and the principals' descriptive statistics. Section fourth presents the methodology and section five the main results. Finally the concluding remarks and some discussions are presented in the last section.

II. Variables

Dependent variable

To analyses the determinants of staffing strategies, we build our dependent variable that takes value 1 if firms promote their workers or 0 if firms decide to recruit an external worker to fill a vacancy. Since we consider that firm determinants to promote are different among blue or white collar jobs, we differentiate among these two cases.

Opportunity cost - Quality of internal and external labour market and firm location

As stated above, the probability to use internal promotion instead external recruitment to fill a vacancy depends on the capacity to find a worker with the right skills inside or outside the firm. The quality of the internal labour market will determine the probability of finding workers

with the right skills inside the firm. In contrast, the specific location of the firm will determine the quality of the external labour market and then the probability to finding the correct workers outside the firm.

We expect that those firms with high levels of internal skills prefer to fill a vacancy internally because they have more opportunities to find in the internal labour market a suitable candidate to train and promote. Another reason is because skills workers are better able to learn new skills and then, needs less training to perform new task efficiently. In order to measure the *quality of the internal labour market*, we use the educational level of workers as a proxy of the firms stock of human capital. Particularly, our human capital variable is measured by the proportion of qualified workers in each occupational group. Additionally we introduce in the regression the percentage of white and blue collar workers that have been in the firm for more than two years¹. This is a proxy of workers expertise but also allow to control for temporally employees. As Burgess and Connell (2006) point out temporary employees tend to be excluded from training, career development and promotion, then we expect a positive relationship between the percentage of permanent employees and the probability to generate human capital into the firm (training).

The decision to use external candidates and not incumbent workers to fill a vacancy depends on the facility to find the correct skill candidates in the external labour market (recruitment cost). Although the important of external labour market characteristics on the decision to use an external candidate to fill a vacancy is clear (Behaghel et al. 2008), no evidence of the effects of external labour market characteristics on firm decisions exist, except in Bayo and Ortin (2006)² who introduce a dummy variable to indicate if there are other plants belonging to the same sector in the province as an external labour market variable. The assumption is that the pool of external applicants increase with the number of firms in the same industry, then the recruitment cost is lower for those areas where the number of firms in the same industry is higher, that's because it is easier to attract correct external workers. Unfortunately, their results not show a statistically significant impact of the presence of similar plants on promotion decisions. One reason will be the fact that it is difficult to measure the size of the pool of external applicants using a dummy variable that only indicates if there are other similar plant near to the firm. To correct this we consider the number of firms in the same industry

¹ See Fibla and Mañe (2011) for a description of these variables.

² In this sense Bayo and Ortin (2006) is the first study to provide empirical evidence on the main factors correlate with the use of internal promotion instead of external recruitment. They analyse firms' promotion decisions for blue collar workers using Spanish manufacturing data for large firms.

but also the skills level of the external candidates, the density of the local labour market and the facilities for worker mobility. Another explanation is related the territorial approach used to build this variable. They use the province level and it's possible that this geographical area would be large and heterogeneous, is for this reason that the territorial level used to build our labour market variables is the travel-to-work areas.

The travel-to-work areas are common used on the industrial location literature in order to homogenise territorial units from different countries and because local data better illustrate the location decisions (Arauzo, 2007). In the particular case of external labour market do not seem to be defined by administrative territorial units (states, provinces, countries or municipalities) but by functional territorial units like travel-to-work areas or metropolitan areas. The boundaries of the travel-to-work areas are made in accordance with economic data such as resident working population, total working population and commuting data from the place where people live to the place where they work. Hence, as Arauzo point out, these areas can be defined as local closed labour markets inside which most people in the area live and work. Following this definition, it seems plausible use travel-to-work areas as a territorial approach to build our labour market variables³.

We use different labour market variables. The first one represents the level of general knowledge in the external labour markets, and we use as a proxy the education level of the external candidates and also the percentage of workers in high knowledge sectors in logarithmic and differentiating among manufacture and services sectors. The second one represents the industry specific knowledge and we use as a proxy the log of the number of firms in the same industry. The third one is the log of the distance between the local labour market and the capital of the province measured by time spent, we use this variable has a proxy of the density of local labour market. Finally, in order to control for worker mobility facilities we introduce in the analysis a dummy that take value 1 if there are some train station in the local labour market, and zero in other case⁴.

Technological development

As we discuss above, the use of new technologies in the production process have a clear impact on the workers' skills and knowledge requirements. The new workforce needs different

³ In this paper we use the travel-to-work areas defined by Boix and Galletto (2006) and used by Arauzo (2007).

⁴ See annex 1 for a description of the external labour market variables

skills and knowledge to deal with technological change, is for this reason that firms have to adapt the old workers skills to the new ones. For do that, firms have two ways, the first one is to hire new workers with the new skills and knowledge that allow working efficiently with the new technologies, and the second ones is by training the incumbent workers and providing them with the new skills and knowledge. The second option may be positive correlated with firm promotion strategy in order to protect their investment in training.

To analyze the effect of new technologies on the probability to use the internal labour market rather than the external ones to fill a vacancy we use two different types of technological measures. The first one, measure the firm technological complexity levels, and the second one, measure the importance for the firm to have workers with information and communication technology skills.

To measure *technological complexity* levels in the manufacturing sector we employ a similar measure used by [Doms et al. \(1997\)](#) and [Gale et al. \(2002\)](#). It consists on an additive index of different advance manufacturing technologies (ATM) that firms use in their production process. In the survey we ask if the firm used any of nine different production technologies, which by their nature can be complementarity to each other, and used in any manufacturing industry. These technologies include computer controlled machines, computer-aided design (CAD), automatic storage, flexible production systems, factory data network, automated sensors used on inputs and final product, computer vision machines and automatic quality control systems. We built different dummy variables to indicate the technological complexity of the firm, low or high. In the case of the service sector we use as a proxy of the firm technological complexity the proportion of workers using computerized equipment, in particular computers. We also built a dummy variable to indicate if firm technological level is low or high.

As a second technological measure we use a dummy variable that take value 1 if the firm consider that information and communication technology skills are essential for business success. This measure allow us to analyze if those firms with workers profiles more oriented to the new technologies prefer to use internal or external labour market to fill a new vacancy either in blue or white collar jobs.

Firm control variables

We use as firm control variables different variables like innovation activity. Since firms have strong innovative cultures that improve when workers interact with the organization, the firms dependence of their workers increase and this makes the worker more valuable for the firms, in others works firm specific knowledge becomes more important, then the probability to promote incumbent workers are higher than recruit and external candidates. In the other hand, it is possible that those more innovative firms also need new thinking and new ideas to constantly innovate, in this case hiring new workers from the external labour market could be the better option to incorporate these new thinking and ideas to the firm. To measure the *innovation activity* of the firm we build a variable that take value 1 if the firm has introduce a new product or has made a great transformation in an old product during the last two years, and 0 in the other case.

We also introduce the *openness on the international markets* as a control variable. This is a dummy variable that take value 1 if the percentage of sales in an international markets are biggest than the industry mean. We expect that this variable works like innovative activity variable, workers from exporting firms could accumulate more specific knowledge that makes them more valuable for the firm, and then firms prefer to use an incumbent worker to fill a vacancy due to the difficulty to find in the external labour market the correct worker.

Other control variables are *size (small and medium)*, belong a *business group* and *age*. In the case of age, its effects on the decision to use internal or external labour markets are not clear. Although the literature point out that old firms know better their external labour market and then they have less difficulty to find the right external candidate, the evidence show that promotion are more common in older firms than in the new ones (Marchante, et al. 2006).

We also take into account the *competitive strategy* of the firm. We differentiate among those firms who use an adjustment strategy to compete than those firms who use another kind of strategy like price or quality. The idea is that those firms who use customization (adjustment) needs to adapt faster to the market changes and customer requests, hence firms specific knowledge could be more important and then incumbent worker more valuable. Although in the other hand, since these changes and requests imply a change in the production process and techniques, it may be possible that firms decide to recruit externally a worker who possesses the new skills and knowledge that allow him to works efficiently with the new production process and techniques.

Following the internal labour market theory, other important issue that we have to take into account it is the existence of ports of entry (Doering and Piore, 1971; and Lazear and Oyer, 2004). This theory is based in the hypothesis that firms have limited entry points, with the main entry point situate at the bottom rung of the job ladder, since this hypothesis is satisfied and we not control for it, our results will be biased. To avoid this effect we introduce in the analyses a dummy variable that reflect for which occupational groups the vacancy rise. In this sense, we expect higher probability to use external labour market to fill a bottom job vacancy like unskilled production workers in the blue collar group or administrative jobs in the white collar group.

Finally, it is possible that firms use the same strategy to fill a vacancy in both white and blue collar groups, hence we introduce in the analyses a dummy variable that take value 1 if the firm use promotion in the other occupational group.

III. Data

To build our dataset we merge two different sources. First source is the Pimec-Sefes Survey 2001. This survey was designed to analyses the recruitment and promotion process into the firms, it provides rich information about these issues, and also about employee-employer characteristics such as worker educational level, firm technological levels, innovation activity, exports, firm ownership and so one. The data were collected by telephone, based on a sample stratified by industry, firm size and region. Second source contains our territorial variables and it comes mainly from the database of Trullén and Boix (2005), the Catalan Statistical Institute (IDESCAT) and the Catalan Cartographical Institute. The final data set contain 728 services and 395 manufacturing firms, table 1 show the distribution by size and sector.

Table 1: Sample distribution by size and sector.

	Manufacturing	Service
Microenterprise (5-9 employees)	97	186
Small firms (10-49 employees)	251	467
Medium firms (50-249 employees)	47	75
Total	395	728

We find that in 2001 about 39,6% of firm vacancies was filled by an incumbent worker. Table 2 shows the distribution by sector and group. The data clearly show that in this sample internal promotion was used more in the manufacture sector and for white collar jobs.

Table 2: Promotion decisions by sector

	% firms use promotion	
	Manufacturing	Service
Vacancy in a white collar group	43,10	39,08
Vacancy in a blue collar group	41,33	37,76

Table 3 reports the means and standard deviations of the variables included in our analysis. Only 40% of the managers in the sample are qualified, and the average percentage of qualified worker in other occupational group is not higher except for administrative jobs. The average percentage of long-term employment contract (two or more years) is higher for white collar workers. The percentage of low and medium technological firms is higher than the percentage of high technological ones; quality is the most extent strategy; only 31% of the firms export more than the industrial mean; and 58,5% of firms have introduced some new product in the last two years. The firms' average size is 30 employees; the average age is 22; and only 20% are part of a group of firms.

The percentage of firms located in high educational areas is higher; and 76% of the firms are located in an area with rail station.

If we compare the characteristics of those firms who promote from those who hire external workers, we not observe a clear profile. It depends on the sector and the occupational group where the vacancy rises. Even so, promoters tend to have lower qualified managers but the percentage of workers with more than two years experiences is higher. Among promoters, the technological level is lower, although the innovation activity is higher but only for manufacture firms. For services firms the relationship between promotion and innovation activity is not clear.

The same thing occurs with the exporting activity, for manufacturing firms the percentage of exporters is higher in the promoter group. Finally, in the case of service firms we observe that those firms who hire external workers tend to be located in high intensive knowledge areas

and with high concentration of manufacture and service intensive knowledge firms. In contrast, for manufacture firms the relation between be located in high knowledge areas and hire or promote workers is not clear.

Table 3: Descriptive Statistics

	Total sample		Manufacturing								Service							
			Vacancy blue collar group				Vacancy white collar group				Vacancy blue collar group				Vacancy white collar group			
			Hire external worker		Promote internal worker		Hire external worker		Promote internal worker		Hire external worker		Promote internal worker		Hire external worker		Promote internal worker	
	Mean	s.d,	Mean	s.d,	Mean	s.d,	Mean	s.d,	Mean	s.d,	Mean	s.d,	Mean	s.d,	Mean	s.d,	Mean	s.d,
Qualif_manager	0,400	0,446	0,445	0,455	0,357	0,428	0,444	0,430	0,456	0,466	0,410	0,437	0,292	0,415	0,491	0,448	0,340	0,437
Qualif_professional	0,328	0,428	0,358	0,441	0,361	0,450	0,442	0,440	0,392	0,442	0,264	0,395	0,286	0,413	0,391	0,436	0,323	0,422
Qualif_clerk	0,719	0,397	0,707	0,408	0,631	0,443	0,694	0,388	0,743	0,399	0,722	0,397	0,706	0,399	0,760	0,363	0,743	0,375
Qualif_supervisor	0,401	0,428	0,368	0,397	0,426	0,417	0,405	0,409	0,459	0,434	0,382	0,430	0,466	0,436	0,422	0,452	0,421	0,447
Qualif_low skill worker	0,224	0,360	0,249	0,363	0,207	0,347	0,253	0,375	0,213	0,356	0,247	0,368	0,239	0,378	0,203	0,341	0,235	0,372
% Qualif_operator	0,317	0,431	0,114	0,252	0,204	0,355	0,153	0,302	0,182	0,358	0,415	0,467	0,400	0,460	0,422	0,468	0,461	0,467
Experience withe	0,852	0,229	0,852	0,226	0,862	0,240	0,815	0,209	0,885	0,211	0,851	0,237	0,853	0,238	0,802	0,221	0,874	0,199
Experience blue	0,703	0,307	0,688	0,273	0,760	0,277	0,701	0,304	0,754	0,264	0,686	0,295	0,732	0,291	0,643	0,352	0,744	0,295
Low technological level	0,359	0,480	0,394	0,490	0,413	0,494	0,313	0,466	0,326	0,471	0,389	0,488	0,407	0,492	0,235	0,425	0,286	0,453
Medium technological level	0,347	0,476	0,360	0,481	0,350	0,479	0,433	0,497	0,370	0,485	0,338	0,474	0,347	0,477	0,332	0,472	0,330	0,471
High technological level	0,294	0,456	0,246	0,432	0,238	0,427	0,254	0,437	0,304	0,463	0,273	0,446	0,245	0,431	0,433	0,496	0,384	0,488
Price strategy	0,167	0,374	0,202	0,402	0,217	0,414	0,127	0,334	0,239	0,429	0,151	0,358	0,139	0,347	0,138	0,346	0,130	0,337
Quality strategy	0,565	0,496	0,552	0,499	0,524	0,501	0,597	0,492	0,500	0,503	0,551	0,498	0,639	0,481	0,564	0,497	0,584	0,494
Innovation strategy	0,095	0,294	0,094	0,292	0,126	0,333	0,112	0,316	0,130	0,339	0,091	0,288	0,065	0,247	0,111	0,314	0,092	0,290
Ajust strategy	0,172	0,377	0,153	0,361	0,133	0,341	0,164	0,372	0,130	0,339	0,207	0,406	0,157	0,365	0,187	0,390	0,195	0,397
Innovation activity	0,585	0,493	0,621	0,486	0,664	0,474	0,604	0,491	0,717	0,453	0,580	0,494	0,514	0,501	0,567	0,496	0,600	0,491
Promote managers	0,014	0,119	0,010	0,099	0,028	0,165	0,007	0,086	0,054	0,228	0,014	0,119	0,005	0,068	0,024	0,154	0,011	0,104
Promote professionals	0,251	0,434	0,261	0,440	0,245	0,431	0,455	0,500	0,467	0,502	0,165	0,372	0,292	0,456	0,349	0,478	0,373	0,485
Promote clerical	0,371	0,483	0,281	0,450	0,273	0,447	0,537	0,500	0,478	0,502	0,327	0,470	0,343	0,476	0,626	0,485	0,616	0,488
Promote Supervisors	0,403	0,491	0,325	0,470	0,490	0,502	0,291	0,456	0,370	0,485	0,503	0,501	0,644	0,480	0,346	0,477	0,459	0,500

Continue

Promote Operators	0,167	0,374	0,291	0,455	0,301	0,460	0,216	0,413	0,228	0,422	0,142	0,350	0,157	0,365	0,111	0,314	0,108	0,311
Promote Low skill workers	0,247	0,431	0,384	0,488	0,210	0,409	0,246	0,432	0,228	0,422	0,355	0,479	0,199	0,400	0,163	0,370	0,184	0,388
Size firm	30,50	93,34	29,798	58,102	28,608	54,719	39,463	83,493	29,315	37,825	27,605	41,516	34,731	17,047	36,675	85,957	38,184	18,530
Exporter firm	0,311	0,463	0,443	0,498	0,462	0,500	0,515	0,502	0,565	0,498	0,244	0,430	0,204	0,404	0,249	0,433	0,265	0,442
Group firms	0,204	0,403	0,138	0,346	0,168	0,375	0,142	0,350	0,228	0,422	0,230	0,422	0,185	0,389	0,266	0,443	0,259	0,440
Firms age	22,74	21,98	24,557	26,068	25,994	24,318	26,299	29,674	27,088	20,141	22,279	20,463	18,940	19,429	21,792	19,217	21,454	21,909
Firms in the same industry	7,321	1,918	6,968	2,083	6,584	1,875	7,090	1,998	7,044	2,037	7,466	1,718	7,296	1,743	7,807	1,802	7,536	1,792
Low educational level	0,224	0,417	0,246	0,432	0,252	0,436	0,201	0,403	0,217	0,415	0,224	0,418	0,236	0,426	0,176	0,382	0,227	0,420
Medium educational level	0,360	0,480	0,384	0,488	0,399	0,491	0,433	0,497	0,359	0,482	0,347	0,477	0,361	0,481	0,356	0,480	0,346	0,477
High educational level	0,417	0,493	0,369	0,484	0,350	0,479	0,366	0,483	0,424	0,497	0,429	0,496	0,403	0,492	0,467	0,500	0,427	0,496
Workers in high knowledge manufacturing	-5,771	1,233	-5,716	1,361	-5,700	1,352	-5,628	1,233	-5,648	1,297	-5,800	1,135	-5,839	1,248	-5,840	1,123	-5,791	1,188
Workers in medium knowledge manufacturing	-3,381	0,956	-3,207	0,875	-3,167	0,821	-3,152	0,823	-3,126	0,804	-3,554	0,997	-3,643	1,093	-3,379	0,943	-3,530	1,044
Workers in high knowledge service	-2,110	0,785	-2,207	0,775	-2,339	0,888	-2,160	0,759	-2,175	0,813	-2,085	0,782	-2,100	0,753	-1,946	0,708	-2,072	0,798
Capital distance	4,362	0,215	4,349	0,225	4,369	0,203	4,337	0,229	4,329	0,203	4,383	0,212	4,393	0,217	4,336	0,215	4,369	0,218
Rail station	0,761	0,426	0,729	0,446	0,706	0,457	0,784	0,413	0,761	0,429	0,770	0,422	0,718	0,451	0,796	0,404	0,751	0,433
Number of observations	1123		203		143		134		92		352		216		289		185	

IV. Methodology

The observed endogenous variable in our econometric model y_i , is binary, taking the value 1 if the firm fills a vacancy using incumbent workers and 0 if hire an external candidate. We assume that this decision depends on the benefits or utility of each option (U), which at the same time depends on firms and external labour market characteristics. In this case, if the utility to promote is higher than a determinate and unobservable value (U^*) firms decide to promote, in the other case firms decide to hire an external worker. The decision rule could be represented as:

$$y_i=1 \quad \text{if} \quad U_i=\beta x_i > U_i^*$$
$$y_i=0 \quad \text{if} \quad U_i=\beta x_i \leq U_i^*$$

Since each firms have a different U^* and we assume a normal distribution function for U^* , we obtain a Probit model.

$$P(U^* \leq k) = F(k)$$

then

$$P(y_i=1 | x_i) = P(U^* \leq x_i \beta) = F(x_i \beta)$$

if $F(\beta x_i)$ is a normal distribution function then our econometric model will be:

$$y_i = \Phi(x_i \beta) + u_i$$

Where β is a K-vector of parameters, x is a vector of explanatory variables and $u \sim N(0,1)$ is an error term. We estimate this model using maximum likelihood, then our estimation is consistent and efficient (Green, 2003)

In our dataset we have two types of firms. Those firms who have created a new job in the last two years, and those firms who have not created any new job. In the last case we don't have information about promotion decisions, hence we have a select sample since we only observe promotion decisions for those firms how have created a new job. We can not observe the equation for the population as a whole⁵. Then if those firms who created new job place will tend to promote more than those not job creating firms, the sample selection problems appear and the results will tend to be biased (Heckman, 1979). In order to solve the sample selection problems we estimated a Heckman Probit model⁶. This is the equivalent of

⁵ A vacancy could rise for different reasons like sacking, retirement or new job creation. In our case a vacancy occurs because firms create a new job.

⁶ See Van de Ven and Van Praag (1981) and Berinsky (2004) for a special application of Heckman's sample selection model when the second stage equation is also Probit.

Heckman's selection model except in our case we have a probit model in the selection equation and a probit model in the outcome equation. The first probit model is whether the firms create a new job or not, and the second probit model is related to the decision to the use or not of incumbent worker to fill the new vacancy. In this case we have three types of observations in our sample with the following probabilities:

$$\begin{aligned}
 y_1=0 & \quad P(y_1=0 \mid x_1) = \Phi_1(-x_1\beta_1) \\
 y_1=1, y_2=0 & \quad P(y_1=1, y_2=0 \mid x_1, x_2) = \Phi_1(x_1\beta_1) - \Phi_2(x_1\beta_1, x_2\beta_2, \rho) \\
 y_1=1, y_2=1 & \quad P(y_1=1, y_2=1 \mid x_1, x_2) = \Phi_2(x_1\beta_1, x_2\beta_2, \rho)
 \end{aligned}$$

From this, the log-likelihood function is:

$$\ln L = \sum \{y_{i1}y_{i2} \ln \Phi_2(x_1\beta_1, x_2\beta_2, \rho) + y_{i1}(1-y_{i2}) \ln [\Phi_1(x_1\beta_1) - \Phi_2(x_1\beta_1, x_2\beta_2, \rho)] + (1-y_{i1}) \ln \Phi_1(-x_1\beta_1)\}$$

As with the Heckman model, our estimation includes at last one variable in the selection equation that does not appear in the outcome equation. The results are similar to those obtained with the Probit model, that because the test of independent equation has been rejected, then the correlation between both equations is very low. That's mean there are not any relationship between firm job creation and the probability to use promotion, in other words, there are not a sample selection problems, hence the use of Heckman estimation is not necessary. We can estimate the promotion decision equation using Probit model and obtain consistent results.

V. Results

Table 4 reports the regression results of our analysis in order to find the effects of new technologies, internal labour market characteristics and firm location on employer strategies for filling a vacant position in manufacture and service firms. The first two models analyse the manufacturing firm's decision to promote or recruit external candidates differentiating among blue and white collar jobs, and the following two models are focused on service firms.

The results for blue collar group in the manufacturing sector (model 1), as we expected, shows a positive effects of the human capital level of blue collar workers on the decision to fill a vacancy using internal labour market. The coefficient of the percentage of qualified operator

workers is positive and significant, and the coefficient of blue collar workers experience also is positive and significant when we control for external labour market characteristics.

One of the main results obtained in our analyses is the fact that firms with very qualified top manager show higher probability to fill a vacancy on the blue collar group using external labour market. That's means that when a vacancy rises, high skill managers take this as an opportunity to acquire new knowledge and news thinking from outsiders. That's could be because more skill managers have greater capacity to implement more efficiently external recruitment process, hence the recruitment costs are lower encouraging outsourcing. Other reason could be because these kinds of managers have more capacity to use the new human resource practices (remuneration practices, training, etc) to improve worker effort, motivation and satisfaction, hence the use of promotion as a motivation mechanism is less necessary.

Firm technological complexity, measured as the number of advance manufacture technology, not seem to have a significant effects on the decision to use internal or external candidates, although those firms who required production workers with ICT technical knowledge trend to use more incumbent workers to fill a vacancy. Since we consider that those manufacturing firms who required ICT knowledge have more technological advance production process, the positive and significant coefficient of this variable could means that those firms are more firm specific knowledge and the way it used to accumulate this knowledge is essentially through learning "on the job", hence incumbent worker are better candidate to fill a vacancy because possess this firm specific knowledge. The same thing occurs with innovation activity, the results confirm that those firms with strong innovation culture trend to use more promotion than external recruitment, hence firm specific knowledge in the production area is more important than new skills, knowledge or thinking that an external candidate can possess.

Other elements that can affect the decisions to use internal or external labour markets are the competitive strategy and the openness to the international markets. In the first case the coefficient of the variable is negative and significant, this mean that those firms who trend to adjust more it's products to the customers' requests trend to use more external candidates to fill a vacancy, then we can argue that specific knowledge are less important to the production process. As we mention early, an explanation of this would be that to follow an customization strategy efficiently firms needs to adapt more quickly to changes in the market demand and introduce new production process and techniques, hence firm specific production knowledge is not so important as new thinking, skills and ideas that allow workers to adapt quickly to the

demand change. Finally, it seems that compete in international markets have not a significant effects on firm recruitment decision.

Also, it has not a significant effect of other firms' characteristics like age, size, or belong a group. However, in our case, the results show how those firms with higher percentage of workers in the bottom of the hierarchical structure trend to use more external candidates to fill a blue collar job vacancy. That's means as more hierarchical or pyramidal the job structure lower probability to use promotion to fill a new vacancy.

Respect to the existence of ports of entry the result is consistent with the internal labour market theory, the probability to fill a vacancy using external labour market is lower for a top ladder jobs. Also the dummy used to control for promotion decisions in other occupational group have a positive and significant coefficient, this means that firms trend to follow the same strategy for both white and blue collar groups even if some factors affects different to each group.

Finally, the variables related to the characteristics of external labour market also have a significant effect on firm decisions, although the results are mix. In the case of formal education we observe that those firms located in a high educated external labor market trend to promote more in blue collar jobs. An explanation of this could be the fact that firm recruits production workers with medium educational level, then in those markets with high educated workers the search for an external medium educated candidate to fill a vacancy could be more complicated and firms prefer to promote incumbents. In the other hand, the effect of being localized in high knowledge services areas has a negative impact on the probability to fill a vacancy using internal promotion. A possible explanation for this might be the fact that those manufacturing firms located in these areas trend to be more dynamic and competitive hence they need more new thinking, new skills or ability and they use the vacancy to acquire these skills from outsiders. Another possible explanation is the fact that those manufacturing firms situated in high services sector areas have more access to high quality consulting service and they can use it to improve their knowledge of external labour market, and that's reduce the uncertainly and cost of external recruitments process.

In contrast, the effects of be localized in a high knowledge manufacturing area or in an area with high number of firms in the same industry have no effect on firm promotion decisions. This might be because, even if in these areas the probability to find workers with the right skills

or abilities outside the firm is higher, the difficult to retain skill workers increase, and then there might be double effects on firm's decisions. The first one is a positive effects among are located in a high knowledge manufacturing o specific industrial areas and the use of external labour market to fill a vacancy because it is easier to find a correct external candidate with lower recruitment cost. The second effect is negative due that for incumbent workers is easier to find another job outside the firm, then for firms are much complicated to retain its workers and they use promotion as a retention mechanism.

In model 2 we analyse the determinants of use internal or external labour market to fill a vacancy in the white collar group. For this type of workers firm internal characteristics are more important than external ones. In this case the human capital levels of clerical workers in terms of formal education have a positive and significant impact on promotion decisions. Another interesting result is that when a vacancy rises in a management job, firms trend to fill it using incumbent workers- existence of port of entry in management job-. This result suggests that SMEs Catalan firms in order to reduce succession risk prefer to hiring internal candidates than recruit an external manager. Since Catalan firms are adverse to change its strategy, they prefer a person who knows the firm culture, people and strategy, it is for this reason that the best candidate to fill a manager vacancy it is inside the firm. In contrast if firms need to re-invent itself, then might be probably that they prefer a candidate with new thinking and skill, hence they prefer to look for it in the external labour market.

The results also show a positive relationship between use internal candidate to fill a vacancy and product innovation activity. As we mention above, an explanation of this pattern of result might be that firms with an innovation culture prefer to maintain or improve its specific knowledge by promoting its own white collar workers rather that looking for a new thinking or new abilities outside the firms. In the other hand, as much technological advance is the firm or much the requirement to have white collar workers with high TIC skills, higher the probability to recruit an external candidate to fill a vacancy.

Follow a competitive strategy based in a production adjustment to customer needs and compete in external markets have the same effects that for production workers, but now other firms characteristics like age or belong a business group affect positively the promotion probability. This means that older firms and business group firms use less external candidates to fill a vacancy in the management area, and that's might be because these firms have more strong culture and specific knowledge that only incumbent workers possess.

Finally, it seems that for white collar workers sector specific knowledge is more important than generic ones. Are located in an area with other firms in the same industry increase the probability to recruit external candidates to fill a vacancy, in contrast, are located in high knowledge manufacturing or service areas not affect promotion decisions. That is because in the first case firms can find easier other white collar workers with sector specific knowledge and skills.

Model 3 and 4 are referring to the service sector. We observe that internal and external firm's characteristics are important in order to decide between internal or external candidates either for manager and production areas. The results obtained in the manufacturing sector related to the high qualified manager also occur here for both occupational groups. This corroborates the idea that more skill managers trend to refresh the human capital existing in the firm by incorporate new workers from outsider independently of the sector. Furthermore, the results show that the requirements for new thinking and new skills in a production area are higher for those more innovative and technological services firms and it is for this reason that these firms prefer to recruit an external candidate to fill a blue collar vacancy (model 3). Then, unlike happens in the manufacturing sector where new technologies and innovation activity increase the probability to use promotion, in the service sector these two variable increases the probability to hire an external candidate to fill a new vacancy. The difference between both results might be due to the fact that manufacturing sector is more firm specific knowledge than the service sector, then for manufacturing firms the specific knowledge of the incumbent workers are more valuable.

Another interesting result from model 3 is the negative and significant of the age coefficient, it could means that old service firms needs two refresh its knowledge and skills it's for this reason that they prefer to hire external workers to fill a vacancy in the production area. Finally, firms in the services sectors also present ports of entry in the production area and in this sense as much higher the proportion of skill public contact workers higher the probability to promote in this area.

Respect the decision to promote incumbent workers or hire an external one in the management area (model 4), we observe that white collar workers experience and compete in the international market have a positive impact on the use of an internal candidate to fill a

vacancy. In contrast, be located in intensive knowledge services areas have a negative impact. That's means services firms located in a high services knowledge areas and lead by high skill managers trend to take advantage of a vacancy to acquire new skill, new knowledge or thinking form external candidates. An explanation might be that since these environment are more complex and competitive firms requires to change and adapt quickly their strategy to the new competitive context, hence they need professionals and managers that can adapt quickly to this change in order to re-invent constantly the firm strategy, is for this reason that new skills and new knowledge that an external candidate poses might be more important to the firm than firm specific knowledge that only an incumbent worker poses. Another possible explanation might be that since these areas attract more talent people (Faggian and McCann, 2006, 2009a and 2009b), the cost of attracts and recruit high skill workers from the external labour market are lower, then firms prefer to use an external candidate to fill a vacancy except if the incumbents workers poses high experience.

Another interesting issue is that for services firms there are not ports of entry in white collar jobs. That's reflex the inexistence of professional career in this area and corroborates the idea that firm specific knowledge in this sector is less important than in the manufacturing sector.

Table 4: Determinants of use internal or external labour market to fill a vacancy.

	Sector manufactura	Sector serveis
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	Model 1 Blue collar jobs		Model 2 White collar jobs		Model 3 Blue collar jobs		Model 4 White collar jobs	
	Coef.	Std.Error	Coef.	Std.Error	Coef.	Std.Error	Coef.	Std.Error
Internal factors								
Human Capital								
%Qualf_manager	-0,1380*	0,0793	-0,0280	0,1071	-0,1345**	0,0559	-0,1263**	0,0600
%Qualf_professional	0,0221	0,0779	-0,0644	0,0977	0,0572	0,0610	-0,0051	0,0613
%Qualf_clerk	-0,1898**	0,0798	0,3183***	0,1080	-0,0093	0,0553	0,0154	0,0692
%Qualf_supervisor	0,0675	0,0828	-0,0093	0,1044	0,1567***	0,0556	-0,0827	0,0591
%Qualf_operator	0,3075***	0,1143	-0,0709	0,1459	-0,0725	0,0497	-0,0044	0,0559
%Qualf_low skill worker	0,0240	0,0842	0,0829	0,1052	-0,0517	0,0621	0,0170	0,0654
Experience withe	0,0989	0,1400	0,0457	0,1869	0,0023	0,0975	0,3276**	0,1346
Experience blue	0,2068*	0,1147	0,0325	0,1424	0,0929	0,0849	0,2156***	0,0787
Managers			-0,0479**	0,0228			-0,0018	0,0026
Professionals			0,0140*	0,0074			-0,0063*	0,0034
Clerk			-0,0105	0,0086			0,0009	0,0014
Supervisor	0,0031	0,0028			3,50E-05	0,0016		
Operators	-0,001	0,0012			0,0022**	0,0011		
low skill worker	-0,0057*	0,0034			-0,0017	0,0011		
Technology								
high level	-0,0643	0,0706	-0,1979**	0,0909	-0,1387***	0,0531	0,0412	0,0589
TIC blue	0,3459***	0,0898	0,1131	0,1107	-0,0298	0,0610	0,0165	0,0682
TIC withe	0,0918	0,0693	-0,1674*	0,0925	-0,0033	0,0468	0,0365	0,0516
Competitive estratgy								
adjust	-0,1387*	0,0802	-0,2541***	0,0807	-0,1027*	0,0539	0,0615	0,0636
Innovation activity	0,1149*	0,0654	0,1511*	0,0818	-0,0972**	0,0452	0,0597	0,0489
Promoted group								
Managers			0,3792*	0,1856			0,0722	0,1743
Professionals			0,0845	0,0916			0,0143	0,0548
supervisors	0,3520***	0,0750			0,1985***	0,0528		
Operators	0,2115**	0,0837			0,1229*	0,0749		
Region								
Barcelona	0,3717**	0,1376	-0,0529	0,1817	-0,0871	0,1254	0,0721	0,1355
Ebre	0,5081**	0,1633	-0,0545	0,2996	0,1251	0,2082	0,1284	0,2133
Tarragona	0,2161	0,1765	-0,1955	0,1811	-0,0202	0,1336	0,1105	0,1420
Girona	0,5011**	0,1798	0,1700	0,3078	0,0227	0,1674	0,2147	0,1797
Lleida	0,4517**	0,1582	-0,1977	0,2119	0,0678	0,1523	0,0792	0,1616
Size firm	-0,0281	0,0712	0,0528	0,0877	0,016	0,0443	-0,0280	0,0469
Exporter firm	0,0688	0,0683	0,0782	0,0865	-0,0232	0,0555	0,1015*	0,0605
Group firms	0,0664	0,0920	0,2885**	0,1249	-0,0297	0,0562	0,0225	0,0615
Age	-0,0032	0,0025	0,0144**	0,0063	-0,0053**	0,0024	-0,0013	0,0031

Age2	0,0000	0,0000	-0,0001	0,0001	0,0001**	1,90E-05	2,00E-05	2,90E-05
Control promotion	0,4774***	0,0650	0,6414***	0,0671	0,4787***	0,0480	0,5231***	0,0480
External factors								
Firms in the same industry	-0,0038	0,0317	-0,109***	0,0511	-0,0188	0,0369	0,0345	0,0382
Eduational level								
Medium level	0,1135	0,1057	0,0567	0,1502	0,0363	0,0820	0,0018	0,0867
High level	0,2868**	0,1365	0,2882	0,2028	-0,0402	0,1074	0,1293	0,1143
Workers in high knowledge sectors								
Workers in high knowledge manufacturing	0,0147	0,0350	0,0484	0,0430	0,0319	0,0243	0,0158	0,0266
Workers in medium-high knowledge manufacturing	0,0710	0,0529	-0,0001	0,0794	-0,0599*	0,0326	0,0240	0,0361
Workers in high knowledge services	-0,1376*	0,0787	0,1268	0,1268	0,0723	0,0774	-0,1683**	0,0753
Capital distance	-0,5279	0,3851	-0,3297	0,4977	-0,3413	0,2626	-0,1161	0,3032
Rail station	-0,0861	0,1123	-0,0148	0,1458	-0,0850	0,0742	0,0289	0,0801
N	343		227		591		500	
Pseudo R2	0,2942		0,3352		0,2318		0,2513	

Nota: Probit Model: Dependent variable takes value 1 if firm use promotion to fill a vacancy, an takes value 0 if firm use an external candidate. We control for sectorial variables. ***, ** and * denote statistical significance of 1%, 5% and 10% respectively.

Finally, it is interesting to analyse if the effects of new technology or innovation activity on staffing strategy depends on firm location. In order to analyse this issue in table 5 we interact technological complexity and product innovative dummies with those variables related to be located in high and medium knowledge areas.

In model 1, the positive and significant coefficient of the technological variables confirms the hypothesis that high technological manufacturing firms trend to use more promotion strategy to fill a vacancy in blue collar jobs. When we analyse the interaction variables we observe that those more technological firms located in high manufacture knowledge areas trend to use more incumbent workers to fill a vacancy than those high technological firms situated in low knowledge areas. This result points out the relevance of firm specific knowledge in these firms. First, we can think that the pool of external candidates might be higher in high manufacturing knowledge areas, then the probability to us external labour market to fill a vacancy should be higher. But, since skill workers have more opportunities to find a job with good conditions in high knowledge manufacture areas than in low ones, the needs to retain workers might be higher for those technological firms located in high knowledge areas than those located in the low ones. Then, in order to retain skill workers the probability to use internal labour market to fill a vacancy increase.

In the case of innovative firms, model 1 in table 4 showed a positive effects of be an innovative firm and promotion decisions, but if we interact be innovative with be located in high knowledge manufacture areas we observe how the sign change (table 5). It is possible that, in table 4, the positive sign not refers to the existents of more firm specific knowledge in those more innovative firms but the difficulty to find skill external workers that allow the firm to be more innovative, especially when those firms are located in low knowledge areas. It is for this reason that when we interact both variables we observe that be innovative and are located in a high knowledge areas improve the probability to recruit external worker, and that is because it is more easy to find the correct skill worker with new knowledge, skills and thinking in these areas.

The results in the management area (model 2 of table 4) showed a positive effect of innovation on firm promotion decisions but when we interact this variable with be located in high technological area, although the sign not change, the coefficient becomes not significant (model 2 of table 5). In the case of high technological firms the results point out that, in contrast with what happens in the production area, firms prefer to require external workers to fill a vacancy in the management area (model 2 of table 4). But, if we interact this variable with location variables the sign of the coefficient change and become not significant in any case. Then, the effects of the interactions between innovative or technological variables and location variables on firm staffing strategies in with collar jobs are not clear.

In the case of service firms, in table 4 we observed that those more advance technological firms trend to use more external labour market to fill a vacancy in blue collar jobs, but went we interact the technological variable with firm location the results change. Now, model 3 of table 5 shows how advance technological firms located in high knowledge areas increase the probability to use internal labour market to fill a vacancy. The same occurs with innovative firms, while be innovative increase the probability to use external candidate to fill a vacancy, this probability is reduced if this innovative firm is located in a high knowledge area. Both results might hide the need for those service firms with high innovation and technological culture to retain production workers particularly in high manufacture knowledge areas, then promotion are used as a mechanism to retain workers. However, this only occurs in the production area and not in the management one where the probability to use incumbent workers to fill a vacancy is reduced for those more innovative and technological firms located in high manufacturing knowledge areas.

Table 5: Determinants of use internal or external labour market to fill a vacancy (Interactions)

	Manufacturing sector				Service sector			
	Model 1 Blue collar jobs		Model 2 White collar jobs		Model 3 Blue collar jobs		Model 4 White collar jobs	
	Coef.	Std.Error	Coef.	Std.Error	Coef.	Std.Error	Coef.	Std.Error
Interactions								
Technology								
high level*Workers in high knowledge manufacture	0,1401***	0,0526	0,0906	0,0763	0,1040**	0,0510	-0,0760*	0,0461
high level*Workers in medium-high knowledge manufacture	0,0283	0,0873	-0,0699	0,1072	0,0771	0,0595	-0,1420**	0,0710
high level*Workers in high knowledge services	0,0362	0,0906	0,0093	0,1292	0,0865	0,0837	0,0564	0,0730
Innovation activity								
Innovation *Workers in high knowledge manufacture	0,0039	0,0609	-0,0299	0,0770	-0,0368	0,0395	0,0674	0,0431
Innovation *Workers in medium-high knowledge manufacture	-0,2002*	0,1071	0,1563	0,1295	0,1573***	0,0482	-0,1296**	0,0604
Innovation *Workers in high knowledge services	0,0033	0,0967	0,1603	0,1219	-0,0723	0,0647	0,0318	0,0708
Internal factors								
Human Capital								
%Qualf_manager	-0,1733**	0,0830	-0,0135	0,1088	-0,1460***	0,0566	-0,1178*	0,0613
%Qualf_professional	0,0295	0,0802	-0,0674	0,0980	0,0713	0,0618	-0,0067	0,0619
%Qualf_clerk	-0,1611**	0,0813	0,3080***	0,1115	-0,0379	0,0562	0,0525	0,0694
%Qualf_supervisor	0,0911	0,0837	-0,0054	0,1060	0,1812***	0,0572	-0,0944	0,0615
%Qualf_operator	0,2705***	0,1148	-0,0499	0,1487	-0,0757	0,0506	-0,016	0,0574
%Qualf_low skill worker	0,0418	0,0865	0,0810	0,1088	-0,0602	0,0634	0,0387	0,0667
Experience withe	0,0551	0,1433	0,1110	0,1957	-0,0270	0,0992	0,3381**	0,1353
Experience blue	0,2231**	0,1154	0,0165	0,1507	0,1197	0,0874	0,2309***	0,0806
Managers			-0,0468**	0,0249			-0,0015	0,0026
Professionals			0,0140*	0,0078			-0,0059*	0,0033
Clerk			-0,0101	0,0071			0,0007	0,0014
Supervisor	0,0031	0,0029			0,0003	0,0016		
Operators	-0,0011	0,0014			0,0021**	0,0011		
low skill worker	-0,0057*	0,0035			-0,0018*	0,0011		
Technology								
high level	0,9103**	0,4105	0,1498	0,5726	0,9057***	0,3724	-0,7651**	0,3392
TIC blue	0,3343***	0,0895	0,0788	0,1129	-0,0202	0,0617	-0,0355	0,0696
TIC withe	0,0850	0,0701	-0,1569	0,0970	-0,0054	0,0472	0,0453	0,0515
Competitive estratgy								
adjust	-0,1046	0,0828	-0,2176**	0,0871	-0,1051*	0,0535	0,0699	0,0647
Innovation activity	-0,4441	0,3755	0,6550	0,2784	0,0834	0,2990	0,0909	0,3005
Promoted group								
Managers			0,3927**	0,1591			0,0555	0,1705
Professionals			0,0769	0,0968			-0,0023	0,0549
supervisors	0,3502***	0,0758			0,1928***	0,0539		
Operators	0,2270***	0,0860			0,0833	0,0740		
Region								
Barcelona	0,3396**	0,1413	-0,1066	0,1773	-0,0814	0,1222	0,0890	0,1364
Ebre	0,4988**	0,1636	-0,1123	0,2837	0,1652	0,2052	0,1189	0,2164
Tarragona	0,2435	0,1764	-0,2388	0,1738	-0,0051	0,1323	0,1058	0,1420

Girona	0,4587**	0,1861	0,1274	0,3107	0,0640	0,1645	0,2090	0,1845
Lleida	0,4345**	0,1633	-0,2689	0,1882	0,0836	0,1528	0,0837	0,1660
Size firm	-0,0192	0,0706	0,0690	0,0900	0,0191	0,0445	-0,0356	0,0468
Exporter firm	0,0777	0,0705	0,0803	0,0862	-0,0345	0,0547	0,1311**	0,0614
Group firms	0,0528	0,0929	0,2124	0,1325	-0,0199	0,0577	0,0151	0,0617
Age	-0,0042	0,0026	0,0147**	0,0065	-0,0050**	0,0025	-0,0016	0,0031
Age2	0,0001	0,0000	-0,0001	0,0001	0,0001*	2,04E-05	2,16E-05	2,90E-05
Control promotion	0,4980***	0,0649	0,6405***	0,0700	0,5083***	0,0476	0,5448***	0,0484
External factors								
Firms in the same industry	-0,0068	0,0322	-0,1137**	0,0524	-0,0203	0,0356	0,0371	0,0387
Educational level								
Medium level	0,0973	0,1086	0,0819	0,1541	0,0603	0,0836	0,0250	0,0853
High level	0,2782**	0,1392	0,3289	0,2005	-0,0256	0,1081	0,1711	0,1160
Workers in high knowledge sectors								
Workers in high knowledge manufacture	-0,0597	0,0528	0,0332	0,0683	0,0323	0,0328	0,0067	0,0410
Workers in medium-high knowledge manufacture	0,2278**	0,1078	-0,1034	0,1268	-0,1851***	0,0475	0,1577***	0,0578
Workers in high knowledge services	-0,1424	0,1069	0,0074	0,1511	0,0908	0,0837	-0,2226**	0,0964
Capital distance	-0,4124	0,3820	-0,3277	0,5014	-0,4377	0,2709	-0,0946	0,3139
Rail station	-0,0851	0,1147	-0,0601	0,1486	-0,1116	0,0761	0,0535	0,0783
N	343		227		591		500	
Pseudo R2	0.3161		0.3511		0.2532		0.2723	

Nota: Probit Model: Dependent variable takes value 1 if firm use promotion to fill a vacancy, an takes value 0 if firm use an external candidate. We control for sectorial variables. ***, ** and * denote statistical significance of 1%, 5% and 10% respectively.

VI. Conclusion

How to fill a vacancy is an important managerial decision since it is an excellent time to recruit the correct worker to improve firm performance. This recruitment may be done with internal workers, by promotion an incumbent worker, or with external ones, by hire a new worker from the external labour market, although both alternatives have their own cost and benefits.

Following different theories we can identify three main reasons for use internal candidates rather than external ones. First, the existence of firm specific human capital, that makes more difficult to find an external candidate who could outperform an existing worker. Second, the necessity to reduce the adverse selection problems in the recruitment process, by the firm is easier to observe with more precision the abilities, motivation and performance of incumbent

workers rather than external ones. Third, it provides to the incumbent workers the incentive to work hard in order to get the vacancy, and also could be a good mechanism to retain the best skill workers (motivation and retention mechanism).

However, there are others issues that may affect this choice but the last theories don't take into account. In this paper we try to shed some light on what are those other issues that may affect firm decision to use internal or external labour market.

The first issue that we take into account in our analyses is the use of new technologies and innovation activities. We consider that the decision to use internal promotion depends on the match between the required characteristics of the job openings and those of incumbent workers. In this sense the implementation of new technologies or firm innovation activities are transforming the workplace moving away from routine tasks and becomes into analytical and interactive tasks and, therefore, changing the skills workers need to perform efficiently. In this context, where firm's specific knowledge may be less important and the difficulty to find internal worker with the correct skill to use these new technologies or to develop innovations could be higher, the probability to look for a worker with the correct skills in the external labor market could also be higher.

The second issue that we consider in our analyses is firm location. In one hand, specific location of the firm will determine the probability of finding workers with the right skills outside the firm reducing the adverse selection problems and the incentives to use incumbent worker to fill a vacancy. In the other hand, location determinate the existent of others firm who may be interested in hire our workers, hence the incentive to use promotion to fill a vacancy increase because firms can use it as mechanism to retain skill workers.

From the results we conclude that exist clear difference behaviour on the decision to fill a vacancy using internal or external labour markets between manufacture and service firms. And this decision depends not only on firm internal characteristics but also on firm location.

In the manufacturing case, we observe a positive relationship between innovations and use incumbent workers to fill a vacancy in a blue and white collar jobs. Then for innovative manufacturing firms the advantage to use internal labour markets are higher- either by the existence of higher firm specific knowledge in those firms, the adverse selection problems or the motivation and retention mechanism- except if those firms are located in high

manufacturing knowledge areas. In this case, the probability to use external labour markets is higher- the coefficient of the interaction of innovation activity and location are negative and significant for blue collar workers- this may respond to a higher facility to find the correct skill workers in those areas, hence a reduction of the adverse selection problems.

The effect of new technologies on the decision to fill a vacancy is different for blue and white collar jobs. In the case of blue collar jobs, the probability to use internal labour market is higher for those firms who use more new technologies. We can interpret this as a signal of a higher relevance of firms specific knowledge related to the use of these new technologies in those firms. It is more, this probability increase if those more technological firms are located in high manufacturing knowledge areas. That's could means that those firms use more internal labour market not only because firms specific knowledge, but also in order to retain their blue collar workers and don't let them go to work to others firms. In contrast, advance technological firms trend to use more external candidates to fill a vacancy if this vacancy is in white collar jobs independently of firm location. Hence, it seems that for these kinds of jobs the advantage to recruit from the external labour market is higher than the advantage to recruit from internal one. In other words, the benefits to hire an external candidate - benefits like new thinking, knowledge or skills that an external candidate can provide- are higher rather than the benefits to promote and incumbent worker – benefits related to firm specific knowledge, adverse selection problems or motivation and retention mechanism.

In the case of service firms, we observe a negative relationship between use new technologies, innovation activity and the probability to use internal labour market to fill a vacancy either in a blue or white collar jobs. Hence, we can assume that for those more technological and innovative firms the advantage from firm specific knowledge that an incumbent worker poses is lower than the advantage from new thinking, knowledge and skills coming from an external candidate. It is for this reason that they prefer to hire an external candidate rather than promote an incumbent ones. Although in the case of blue collar workers that's happens only if those firms are located in low knowledge areas because in the other case the probability to hire an external candidate is reduced, it could be due to the need of those firm to retain their blue workers specially in these areas where workers have more facilities to find good jobs in other firms.

Our results also show that those firms with high qualified manager's trend to use more external labour markets to fill a vacancy rather than internal ones. And finally, the results also

support the hypothesis of ports of entry especially in the manufacturing sector, that's mean firms specific knowledge is more important in the manufacture sector and for top ladder jobs.

The empirical evidence provided in this paper sheds some light regarding the relationship between firms' characteristics and the staffing strategies in SME'S, although would be interesting include into the analyse the relationship between work organizational practices and the decision to promote or to hire external workers, unfortunately given the limitations of the available data in this respect, this remains a topic for future research, as well as the analysis of the staffing strategies on firm performance like productivity.

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Annex 1: External labour market variables

Variables	Definition
Firms in the same industry	log of the number of firms in the same industry
Eduational level	
Medium level	dummy variable that takes value 1 if the average years of schooling of the employee population are in the second tercil
High level	dummy variable that takes value 1 if the average years of schooling of the employee population are in the upper tercil
Workers in high knowledge sectors	
Workers in high knowledge manufacturing	log of the percentage of employees in high knowledge manufacture sector
Workers in medium-high knowledge manufacturing	log of the percentage of employees in medium- high knowledge manufacture sector
Workers in high knowledge services	log of the percentage of employees in high knowledge service sector
Capital distance	log of the distance between the local labour market and the capital of the province measured by time spent
Rail station	dummy variable that take value 1 if there are some train station in the local labour market