



HAL
open science

Filling Vacancies: Identifying the Most Efficient Recruitment Channel

Mareva Sabatier

► **To cite this version:**

Mareva Sabatier. Filling Vacancies: Identifying the Most Efficient Recruitment Channel. Economics Bulletin, 2010, 30 (4), pp.3355-3368. hal-00825991

HAL Id: hal-00825991

<https://hal.science/hal-00825991>

Submitted on 25 May 2013

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Volume 30, Issue 4

Filling vacancies: Identifying the most efficient recruitment channel

Mareva Sabatier
University of Savoie

Abstract

This paper provides new results on the recruitment behaviour of firms by showing that recruitment channels clearly affect the probability of filling a vacancy. Using a French data, we estimate the effectiveness of different recruitment strategies, taking into account that recruitment channels choices are endogenous and that firms strategically combine several channels. Our results enable us to conclude that institutional intermediaries, such as private and public employment agencies, are found to be the most effective channels for firms. However, these intermediaries are specialized, in that private agencies are more efficient at filling skilled vacancies, whereas public agencies are more efficient at filling non-skilled vacancies.

1-Introduction

The search strategies used by jobseekers, and the effectiveness of these strategies in terms of reducing unemployment duration, have been extensively studied (Mortensen, 1986; Devine and Kiefer, 1993). However, little is known about the demand side of recruitment, that is to say, about employers' search behaviours, mainly because micro-data are rather poor or absent. Recruitment occurs at the end of a matching process (Mortensen and Pissarides, 1994) in which both firms and jobseekers develop strategies to meet a potential partner. Hence, the use of inappropriate search strategies by employers and/or by prospective employees can lead to inefficiencies in the matching process and to the simultaneous existence of unemployment and unfilled vacancies. It is therefore crucial to determine how an employer's search behaviour affects the outcome of the recruitment process.

Since Holt and David's (1966) pioneering article, empirical analyses of employers' search strategies have primarily focused on the impact of the search effort, in particular, on the time spent searching and on the number of applications received (Barron and Bishop, 1985; Barron *et al.*, 1985). In this static view, the greater the search effort, the higher the number of applicants. Search effort is also found to have a positive effect in a dynamic view, that is to say, on vacancy duration (Beaumont, 1978, Roper, 1988, Van Ours, 1989).

Moreover, several channels (for example, social networks, advertisements, public and private employment agencies) can be used to locate potential employees and to encourage them to apply (Holzer, 1987). As recruitment channels are information vectors, they influence the probability of receiving applications (Russo *et al.*, 2000) and the cost of the search (Russo *et al.*, 2005). Roper (1988), using British data, concludes that search channels strongly influence vacancy durations. Networks seem to be the most efficient channels for hiring, whereas advertisements, although they are widely used, tend to result in long vacancy durations. Conversely, Holzer (1987) and Van Ours and Ridder (1993), using US and Dutch data respectively, found that advertisements are the best way to rapidly fill a job vacancy.

This lack of consensus on the most efficient recruitment channel may be due to the fact that previous studies have always treated the choice of recruitment channel as exogenous, despite a substantial body of evidence indicating this is not the case. The choice of recruitment channel(s) depends on the characteristics of the vacancy, on the employer's capacity to use a given channel and on the prevailing economic situation. Gorter *et al.* (1996, 1993) showed that the choice of recruitment channel also depends on the type of employees needed by the firm, as employers seeking qualified staff are more likely to use advertisements to fill vacancies, whereas employers seeking personnel in the second segment of the labour market (i.e., fixed-term, part-time and/or low-qualified jobs, see Doeringer and Piore, 1971) are more likely to use local employment agencies. Russo *et al.* (2000) confirmed these results and also concluded that employers are more likely to use advertisements when competition between job seekers is low.

In addition, employers may combine several channels in order to ensure a higher return from searches (Holzer, 1996; Gorter and van Ommeren, 1999). As employers generally use a combination of recruitment channels, rather than one particular channel, search strategies can be defined in terms of the type and the number of recruitment channels used. Channel choices should be treated as correlated. Bessy *et al.* (2007) pointed out that, in France, firms frequently combine several methods to fill vacancies. This can be explained by two characteristics of the French labour market. First, firms must notify the government employment agency (Agence Nationale Pour l'Emploi, ANPE) when a vacancy occurs and the ANPE must inform job seekers of that vacancy. Second, unsolicited applications are used much more frequently by French jobseekers than they are by jobseekers in other countries:

94% of French employers receive at least one unsolicited application per year (Bessy *et al.*, 2007).

Consequently, when analysing the success or failure of a recruitment strategy, it is important to examine the overall strategy adopted by an employer, that is to say, the type(s) of recruitment channels chosen and how these recruitment channels were combined, rather than to simply examine each individual recruitment channel that was used.

The present study differs from previous research in three fundamental ways. (1) It focuses on the combination of recruitment channels and the links between the channels chosen, rather than treating each recruitment channel separately. (2) It investigates the factors determining the choice of recruitment strategy. (3) It assesses the impact of these search strategies, treated as endogenous, on the probability of filling a vacancy.

Our study was based on data from a Job Offer and Recruitment (Offre d'emploi et recrutement – OFER) survey carried out by the French Employment Ministry's research and statistics department (Direction de l'Animation de la Recherche des Etudes et des Statistiques - DARES). This survey provides data on the search channels used by employers, on the reasons for the vacancy and on the success of the recruitment process. By applying simulated likelihood estimation techniques (Cappellari and Jenkins, 2006), we were able to estimate a multivariate probit model that allowed us to determine the effect of the recruitment channel used on the probability of filling a vacancy, taking into account the link between the choice of channels and their endogeneity.

We begin by presenting our dataset. This is followed by a discussion of our dataset, the presentation of the empirical results and our conclusions.

2- Data

Our data was taken from a job offer and recruitment (“Offre d'Emploi et Recrutement” - OFER) survey of employers' recruitment behaviour that was carried out between January and July 2005 by the French Employment Ministry's research and statistics department (Direction de l'Animation de la Recherche des Etudes et des Statistiques - DARES). The survey looked at French firms that had begun a process to recruit at least one employee during the 12 months prior to the survey.

The OFER survey collected data from 4004 firms, each of which provided information about the vacancy, the firm's characteristics and the recruitment procedures used (see Appendix 1 for more details). Of the observed firms, 88% successfully recruited at least one employee and 12% failed to fill the vacancy. In 17.8% of cases, recruitment was for a skilled position.

The OFER dataset also indicates which recruitment channels were used during the search process. Recruitment channels can be classified into five categories: Market methods, such as advertisements and direct applications, including *via* Internet ; Public employment agencies ; Private employment intermediaries, such as private agencies, schools, professional associations, etc. ; Professional relations; and personal relations (friends and relatives).

Descriptive statistics underline three interesting facts. First, only 27% of firms relied upon a single recruitment channel: the combination of several channels is the most used strategy. The five main search channels available to firms can be combined in 31 different ways (see appendix 2). But, among the 31 possible strategies, 11 are used by less than 1% of the firms, that is less than 40 firms. Finally, observed sub-samples on each strategy are often very small. Second, our data also indicate that the choice of search channels is influenced by the characteristics of the employer firm, the vacancy and the macroeconomic context. For

example, small firms seem to prefer to base their recruitment strategies on personal relations, whereas large firms preferred to use private employment agencies. This channel was also the most frequently used when the vacancy concerned an executive position.

Third, success rates vary according to the macroeconomic context, to firms' attributes and to the recruitment strategy used. On the opposite of previous results, which indicated that combining recruitment channels was more effective than using a single channel (Holzer, 1996; Gorter and van Ommeren, 1999), our descriptive statistics highlight more that the recruitment strategy success rates appear to be influenced more strongly by the types of channel used than by the number of channels used. Among the 31 different strategies, five of the most commonly used strategies gave particularly high success rates. Three of these strategies were based on a single channel, that is to say, professional networks (94% success rate), personal networks (95.5% success rate) or market methods (92% success rate). However, even higher success rates were recorded for two combinations of two channels: professional plus private networks (96% success rate) and private agencies plus professional networks (93.9% success rate).

3- Empirical results

Descriptive statistics on the OFER data set confirm that employers combined several recruitment channels to fill their vacancies, but not all the combinations had similar success rates. Among the 31 possible strategies, some are scarcely used. This stops us from directly estimating the strategies' choices. To overcome this difficulty, we choose to focus attention not on strategies' choice but on recruitment channels' ones, taking into account their potential combination. We thus jointly estimate the channels choice equations and the recruitment success equation, that is the following system of equations:

$$\begin{cases} \text{Mark_meth}_i = \beta_1' X_i + \varepsilon_{1i} \\ \text{Pub_ag}_i = \beta_3' X_i + \varepsilon_{3i} \\ \text{Priv_ag}_i = \beta_2' X_i + \varepsilon_{2i} \\ \text{Prof_netw}_i = \beta_4' X_i + \varepsilon_{4i} \\ \text{Pers_netw}_i = \beta_5' X_i + \varepsilon_{5i} \\ \text{Recrut_ok}_i = \gamma' X_i + \mu_i \end{cases}$$

where i is the firm. The first five equations describe the choice of the five search channels: market methods (mark_meth), public agencies (pub_ag), private agencies (priv_ag), professional relations (prof_netw) and personal relations (pers_netw). The final equation defines the probability of success (recrut_ok).

The error terms ε and μ have the following properties:

$$E(\varepsilon_j) = E(\mu) = 0, \text{Var}(\varepsilon_j) = \text{Var}(\mu) = 1, \text{Corr}(\varepsilon_j, \varepsilon_k) = \rho_{jk} \text{ and } \text{Corr}(\varepsilon_j, \mu) = \rho_{j\mu} .$$

The correlation coefficients between the errors of the five choice equations are denoted ρ_{jk} .

If $\rho_{jk} \neq 0$, channel choices are interdependent. Conversely, if $\rho_{jk} = 0$, channel choices are independent. Similarly, the $\rho_{j\mu}$ coefficients indicate the link between the choice equations and the recruitment success equation.

We then have to estimate a system of six equations. In each equation, the dependant variable is a dummy variable. We used a multivariate probit model to estimate the equation system. However, Train (2003) showed that probit probabilities do not have a closed-form expression and must be estimated numerically. In the present study, we used Cappellari and Jenkins' (2006) simulated maximum likelihood technique to estimate our probit probabilities.

As correlation terms between recruitment channels' choices are estimated, we can calculate joint probabilities corresponding to the 31 possible combinations of choosing or not each channel. Estimating the five equation system is then equivalent to studying all the strategies (Greene, 2008). But, the multivariate probit model has a main advantage: estimated probabilities of using each strategy can be deduced from the estimated choices of each recruitment channel and from the correlation terms. Thus, these probabilities can be computed even if some strategies are scarcely used. Moreover, the multivariate probit model allows us to estimate the global probability of choosing a given channel, taking into account that it is combined.

Besides, the X vector includes all the observed attributes that can influence the choice of recruitment channels and also the probability of filling a vacancy. Following Wilde (2000), we suppose that identification variables are not needed as a large variability is observed in explanatory variables. These factors can be indeed divided into five main types: characteristics of the firm: size, sectors, financial health, attributes of the job vacancy: skilled or unskilled, permanent or temporary, part-time or full-time; reason for recruitment: replacement, new activity, increase in demand, internal reorganisation; search context: previous recruitment channels used, number of direct applications received; macroeconomic indicators (taken from *Enquête Emploi*, INSEE and ANPE, 2005).

Table 1 presents the results of this estimation.

Let us begin to comment the results about the recruitment channel choices. First, a number of correlation terms (ρ_{jk}) between the different recruitment channels used by employers are significantly different from zero. For example, the use of professional networks positively correlated with the use of personal relations. This shows that users of strong relations have unobserved characteristics that are positively related with those of users of weak relations. Positive correlations were also found between the use of public employment agencies and private employment agencies, and between the use of market methods and public agencies. On the other hand, all the correlations between the use of private agencies and market methods or personal networks were negative. Our results also show that choices of recruitment channels are interdependent, thus confirming the importance of considering an employer's overall search strategy, rather than, as is often the case in the literature, the individual channels used.

In addition, the results indicate that the choice of recruitment channels depends not only on the existence of other search channels, but also on a firm's characteristics, the type of vacancy and the state of the job market. For example, small firms tend to favour the personal relations channel, whereas larger firms are more likely to favour private agencies and professional relations. This suggests that it is more difficult for small firms to use either expensive recruitment channels, such as private agencies and advertisements, or to exploit professional networks, which are probably less well developed than in large firms.

A firm's choice of recruitment channels is also likely to be influenced by the business sector in which it operates. For example, the recruitment channels most commonly chosen by industrial firms are private and public agencies. Firms in the construction sector tend to favour private employment agencies and personal networks, whereas firms in the service sector tend to favour market methods. This pattern may reflect the fact that France's private employment agencies have a long tradition of industrial and construction-sector recruitment but they have only recently begun focusing on other business sectors. Employment agencies not only give access to large applicant pools, they can also provide help in screening applications (Lesueur, 1997). As a result, many industrial firms have built up long-term relationships (either informal

or contractual) with one or more agencies. In addition, econometric results show that firms that have used private or public agencies in the past are more likely to use them again in the future. This may indicate the existence of learning effects in the use of search methods, which can reduce search costs.

Our results also highlight that the macroeconomic context affect only the choice of market methods and public agencies as recruitment channels. When the competition between job seekers is low, firms are more likely to use advertisements, in the line of the conclusions of Russo *et al.* (2000). But, when the competition is intense, French firms prefer to contact the public intermediary, mainly because the pool of potential applicants is then larger.

Table 1: Multivariate probit estimates of recruitment channels choices and the probability of filling a vacancy

	Professional networks		Public agencies		Private agencies		Market methods		Personal networks		Recruitment success	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t
constant	0.123	1.75	-1.351	-11.10***	-1.144	-12.69***	0.129	1.72*	-0.494	-6.57***	1.297	7.36***
Size												
Small	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	
Medium	0.122	2.18**	0.024	0.26	0.357	5.32***	0.191	3.28***	-0.322	-5.44***	0.054	0.75
Large	0.064	1.11	-0.019	-0.19	0.388	5.45***	0.340	5.37***	-0.494	-7.66***	-0.112	-1.71*
Sector												
Agriculture	-0.105	-1.44	0.122	1.03	0.365	4.19***	-0.133	-1.73*	-0.018	-0.23	0.199	1.19
Construction	0.096	1.29	0.189	1.62	0.400	4.64***	-0.157	-2.03**	0.160	2.08**	-0.349	-2.98***
Industry	-0.135	-2.62***	0.182	2.17**	0.633	10.63***	-0.308	-5.69***	-0.105	-1.85*	-0.112	-0.95
Services	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	
Economic difficulties	0.061	1.31	0.020	0.25	0.092	1.73*	0.003	0.07	0.039	0.77	-0.117	-1.94*
Reason for recruitment												
Replacement	0.108	1.88*	0.124	1.28	0.088	1.23	0.172	2.81***	0.155	2.52***	0.031	0.40
New activity	0.116	1.60	0.215	1.87*	0.784	1.97**	0.048	0.63	0.123	1.59	-0.288	-3.35***
Demand increase	0.175	3.07***	-0.052	-0.54	0.085	1.20	0.227	3.70***	0.143	2.36**	-0.075	-0.97
Reorganisation	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	
Vacancy characteristics												
Executive position	-0.025	-0.42	-0.215	-2.18**	0.377	5.12***	-0.031	-0.48	0.053	0.80	-0.252	-3.63***
Temporary position	-0.027	-0.61	-0.112	-1.47	-0.051	-0.92	-0.009	-0.19	-0.099	-2.05**	0.100	1.64
Part-time position	-0.056	-1.02	0.048	0.52	-0.526	-6.49***	-0.021	-0.35	0.246	4.28***	0.070	0.88
Urgent recruitment	-0.042	-0.99	-0.060	-0.84	-0.138	-2.65***	-0.053	-1.18	-0.027	-0.61	0.073	1.32
Previous search channels												
Public agencies	-0.275	-6.33***	7.493	15.15***	-0.015	-0.27	0.270	5.77***	-0.104	-2.21**		
Private agencies	0.095	1.60	0.125	1.25	7.051	9.14***	0.343	5.22***	0.092	1.47		
Number of direct applications received	0.059	1.12	-0.077	-0.88	0.064	1.04	0.323	5.69***	-0.158	-2.74***		
Macroeconomic indicators												
Number of jobseekers	0.012	0.93	0.458	2.72***	0.422	1.03	-0.758	2.53***	0.070	1.04	0.001	2.08**
Number of job offers	-0.137	1.27	-0.359	3.04***	0.127	1.42	0.982	2.18**	1.289	1.51	-0.001	-2.33***

Table 1:

Correlation coefficients for choice equations	Coef.	t
rho21: Professional networks – Public agencies	-0.062	-1.550
rho31: Professional networks – Private agencies	-0.041	-1.330
rho41: Professional networks – Market methods	-0.039	-1.540
rho51: Professional networks – Personal networks	0.386	16.330***
rho32: Public agencies – Private agencies	0.117	2.990***
rho42: Public agencies – Market methods	0.071	2.070**
rho52: Public agencies – Personal networks	-0.050	-1.330
rho43: Market methods – Private agencies	-0.079	-2.740***
rho53: Personal networks – Private agencies	-0.131	-4.310***
rho54: Personal networks – Market methods	0.017	0.620
Correlation coefficients between choice equations and recruitment success equations	Coef.	t
rho61: Recruitment success – Professional networks	-0.057	-1.800*
rho62: Recruitment success – Public agencies	-0.192	-4.250***
rho63: Recruitment success – Private agencies	-0.063	-1.730*
rho64: Recruitment success – Market methods	-0.100	-2.950***
rho65: Recruitment success – Personal networks	-0.049	-1.420
Number of observations	4004	
Log-Likelihood	-10997.719	
Wald test chi2(96)	61940.01***	

NB: Heteroscedasticity was corrected using the method advocated by White (1982).

***: significant at the 1% level, **: significant at the 5% level, *: significant at the 10% level

The choice of recruitment channels is also influenced by the characteristics of the vacancy. Firms tend to use private agencies to fill skilled positions and to use public agencies to fill less-skilled positions. This result, which is in line with the results obtained by Gorter *et al.* (1996), reflects the fact that French private and public employment agencies have traditionally specialized in recruiting for different kinds of job. Public agencies attract more low-skilled job seekers, whereas private agencies focus on job offers for skilled people. Thus, firms make strategic choices when deciding which recruitment channels to use, selecting the channels that are most likely to give access to suitable applicants. The results also indicate that firms recruiting to fill a new position tend to use employment agencies (private or public) because they can provide help with the screening and selection process. On the other hand, firms seeking a new employee to fill an existing position can directly and efficiently use market methods or networks, as it is relatively easy for the firm to define the characteristics of the vacancy and therefore it does not need help with evaluating and selecting applicants. Finally, because using agencies is costly (mainly in terms of coordination), these channels are less likely to be used when the vacancy must be filled rapidly.

In addition, by estimating a multivariate probit model we were able to analyse the determinants of the probability of filling a vacancy. This probability is lower if the firm has economic difficulties, which may mean that firms with financial problems find it difficult to attract applicants. However, it may also be due to such firms having less time and resources to allocate to the search process. Recruitment success rates are also lower when filling vacancies for newly created posts. In such cases the lower probability of success may be due to firms finding it more difficult to define and describe their needs and to adopt the best strategies for contacting suitable applicants. Success rates are also lower for firms in the construction sector and for firms hiring executive-level staff. This may reflect structural recruitment difficulties in particular segments of the labour market. For example, there is intense competition for labour in the French construction industry, as this sector is not attractive due to its hard working conditions and relatively low wages. As a result, there is a lack of skilled applicants. More generally, it is more difficult to recruit skilled personnel in France than unskilled workers. This seems to be confirmed by the fact that macroeconomic conditions have a substantial affect on the probability of filling a vacancy. The recruitment process is difficult when competition among firms is high and easier when a lot of jobseekers are available, as stressed in matching models (Mortensen and Pissarides, 1990).

However, the most interesting finding is that there is a correlation (correlation coefficients significantly different from zero) between the success equation for the recruitment procedure and all of the recruitment channel equations except for the personal network channel equation. Hence, we can conclude that the probability of filling a vacancy is strongly linked to the choice of recruitment channels. We used the procedure developed by Cappellari and Jenkins (2006) to estimate our multivariate model, which allowed us to calculate the probability of filling a vacancy for each recruitment channel¹. These estimated probabilities take into account the effect of explanatory factors in the choice equations, the links between recruitment choices and the links between the choice equation and the success equation, thereby ensuring an unbiased estimation of the real effect of recruitment channels on recruitment success rates. Table 2 gives estimated conditional-success probabilities for the sample as a whole and for two sub-samples (vacancy for an executive position, vacancy for a non-executive position).

¹ These conditional probabilities take into account the estimated correlation coefficients between the five channels. Alternatively, the estimated success rate associated to each of the 31 recruitment strategies could also be computed. This gives similar results (results available upon request).

**Table 2: Estimated probabilities of filling a job vacancy
for each of the five possible recruitment channels**

Recruitment channel	Percentage of vacancies filled	Estimated probability of filling the vacancy	Estimated probability of filling the vacancy <u>Executive position</u>	Estimated probability of filling the vacancy <u>Non-executive position</u>
Market methods	87.0	85.0	86.0	84.7
Public agencies	83.9	84.1	77.6	86.9
Private agencies	86.0	91.0	95.2	88.5
Professional networks	87.8	87.1	88.8	85.3
Personal networks	87.5	86.8	81.4	89.2

Table 2 compares the observations drawn from the descriptive statistics with the estimated success rates for the different recruitment channels. This comparison indicates that success rates are affected by the endogeneity of the channels and the links between them. Firms using professional networks successfully filled 87.8% of vacancies, suggesting that this is the most effective recruitment channel. However, this apparent effectiveness is the result of selection bias, as the firms that use professional networks are those that have the best chance of successfully recruiting staff. When this bias is corrected, the most effective recruitment channel can be seen to be private employment agencies. As Houseman *et al.* (2003) showed for temporary employment agencies, private agencies facilitate the hiring process by screening and selecting jobseekers. Private agencies also reduce recruitment costs and speed up the matching process, thereby producing economies of scale and increasing the efficiency of a firm's search process.

This more detailed analysis also shows that public employment agencies are not as ineffective as suggested by the descriptive statistics. Although they obtained the lowest success rate when considering all types of vacancy, this is due to their low success rate in filling skilled vacancies. In contrast, they provide a very effective recruitment channel for filling non-skilled vacancies.

The results also provide an insight into the specialization of French private and public employment agencies. As private and public agencies give access to different segments of the labour market, and thus to different types of skills, firms strategically choose them according to their needs. Firms seeking to fill a vacancy for a skilled position tend to favour private agencies, whereas firms seeking unskilled staff or firms that can benefit from public subsidies tend to favour public agencies. In this way, firms limit mismatches in the hiring process.

4- Conclusion

The aim of the present research was to study employers' search behaviours and the impact of different recruitment channels on the probability of filling a vacancy. We thus assumed that firms use different search methods to form a pool of applicants from which one or more candidates can be chosen to fill the vacancy. In this non-sequential search process, recruitment channels are viewed as a means of contacting jobseekers. By combining recruitment channels, firms can increase their chances of successfully filling a vacancy and we found that the choice and combination of recruitment channels is endogenous. A recursive model was used to analyse employers' search behaviour.

We estimated a recursive model, and then tested this model against French survey data through the use of a multivariate probit analysis. This allowed us to take into account the selectivity bias in recruitment channel choices, as well as possible correlations between

recruitment channel choices and their impact on the probability of filling a vacancy. This analysis produced three interesting results. First, recruitment channel choices depend on the characteristics of the firm concerned and of the vacancies to be filled; hence, they are not exogenous. Second, rather than just choosing one channel, firms choose a combination of channels, and choices of which channels to combine are not random. Third, the choice of recruitment strategies strongly influences the probability of filling a vacancy. Private employment agencies appear to be the most effective channels; however firms' choices of recruitment channels tend to be based on strategic criteria. For example, private agencies are more effective in providing access to skilled jobseekers, and public agencies are more effective in providing access to low-skilled workers. This reflects the specialization of these two types of agency in the French labour market.

Our study provides evidence for the important role of employment agencies in the recruitment process. As well as enabling firms to contact jobseekers, employment agencies can provide assistance with the screening and selection process. The use of employment agencies reduces search costs and increases the efficiency of filling a vacancy. These benefits are maximised when firms choose the most appropriate type of agency, that is to say, private agencies for recruiting skilled staff and public agencies for filling low-skilled vacancies. By developing long-term relationships with employment agencies, firms can facilitate the screening and selection process and decrease the risk of mismatches.

References

- Barron J., Bishop J. (1985) "Extensive Search, Intensive Search and Hiring Costs: New Evidence on Employer Hiring Activity" *Economic Inquiry* **23**, 363-382.
- Barron J., Bishop J., Dunkelberg W.C. (1985) "Employer Search: The Interviewing and Hiring of New Employees" *Review of Economics and Statistics* **67**, 43-52.
- Beaumont P.B. (1978) "The Duration of Registered Vacancies: An Explanatory Exercise" *Scottish Journal of Political Economy* **25**, 75-87.
- Bessy C., Marchal E., Rieucan G. (2007) "L'Importance des Candidatures Spontanées en France" *Les 4 pages du Centre d'Etudes de l'Emploi* **47**.
- Cappellari L., Jenkins S.P. (2006) "Calculation of Multivariate Normal Probabilities by Simulation, with Applications to Maximum Simulated Likelihood Estimation" *Discussion paper* number 584, DIW Berlin.
- Devine T.J., Kiefer N.M. (1993) "The Empirical Status of Job Search Theory" *Labour Economics* **1**, 3-24.
- Gorter C., Van Ommeren J. (1999) "Sequencing, Timing and Filling Rates of Recruitment Channels" *Applied Economics* **31**, 1149-1160.
- Gorter C., Nijkamp P., Rietveld P. (1996) "Employers' Recruitment Behaviour and Vacancy Duration: An Empirical Analysis for the Dutch Labour Market" *Applied Economics* **28**, 1463-1474.
- Gorter C., Nijkamp P., Rietveld P. (1993) "The Impact of Employers' Recruitment Behaviour on the Allocation of Vacant Jobs to Unemployed Job Seekers" *Empirical Economics* **18**, 251-269.
- Greene W. (2008) *Econometric Analysis*, 6th Edition, Prentice Hall.
- Holzer H.J. (1996) *What Employers Want*, Russel Sage Foundation, New-York.
- Holzer H.J. (1987) "Hiring Procedures in the Firm: Their Economic Determinants and Outcomes" *NBER Working Paper* number 2185.
- Houseman Susan N., Kalleberf Arne L., Erickcek Georges A. (2003) "The Role of Temporary Agency Employment in Tight Labor Markets" *Industrial and Labor Relations Review* **57**, 1, 105-127.

- Lesueur J-Y. (1997) "L'Intermédiation de l'ANPE sur le Marché du Travail: Une Analyse Néo-institutionnelle" *Revue d'Economie Politique* **4**, 107.
- Mortensen D.T. (1986) "Job Search and Labor Analysis", in *Handbook of Labor Economics*. O. Ashenfelter and R. Layard (Eds), North-Holland, Amsterdam.
- Mortensen D.T., Pissarides C.A. (1994) "Job Creation and Job Destruction in the Theory of Unemployment" *Review of Economic Studies* **61**, 397-415.
- Roper S. (1988) "Recruitment Methods and Vacancy Durations" *Scottish Journal of Political Economy* **35**, 51-64.
- Russo G., Hassink W.H.J., Gorter C. (2005) "Filling Vacancies: An Empirical Analysis of the Cost and Benefit of Search in the Labour Market" *Applied Economics* **37**, 1597-1606.
- Russo G., Rietveld P., Nijkamp P., Gorter C. (2000) "Recruitment Channel Use and Applicant Arrival: An Empirical Analysis" *Empirical Economics* **25**, 673-697.
- Train K. (2003) *Discrete Choice Methods with Simulation*, Cambridge University Press.
- Van Ours J. (1989) "Durations of Dutch Job Vacancies" *De Economist* **137**, 309-327
- Van Ours J., Ridder G. (1993) "Vacancy Durations: Search or Selection?" *Oxford Bulletin of Economics and Statistics* **55**, 187-198.
- Wilde, J. (2000) "Identification of Multiple Equation Probit Models with Endogenous Dummy Regressors" *Economics Letters* **69**, 309-312.

Appendix 1: List of variables

Variable	Description	Obs.	Mean
Recruitment channels			
Market_meth	=1 if market methods are used; =0 otherwise	4004	0.702
Pub_agency	=1 if public agencies are used; =0 otherwise	4004	0.404
Priv_agency	=1 if private agencies are used; =0 otherwise	4004	0.363
Prof_netw	=1 if professional relations are used; =0 otherwise	4004	0.571
Pers_netw	=1 if personal relations are used; =0 otherwise	4004	0.275
Recruitment success			
recrut_ok	=1 if the hiring process succeeds; =0 otherwise	4004	0.885
Firm size			
small	=1 if the firm has 50 or less employees; =0 otherwise	4004	0.479
medium	=1 if the firm has more than 50 but less than 240 employees; =0 otherwise	4004	0.222
large	=1 if the firm has 250 or more employees; =0 otherwise	4004	0.299
Sector			
agricultural	=1 if the firm belongs to the agricultural sector; =0 otherwise	4004	0.087
construction	=1 if the firm belongs to the construction sector; =0 otherwise	4004	0.092
industry	=1 if the firm belongs to the manufacturing sector; =0 otherwise	4004	0.225
service	=1 if the firm belongs to the service sector; =0 otherwise	4004	0.596
Reason for recruitment			
replacement	=1 if the vacancy is due to a replacement; =0 otherwise	4004	0.596
new activity	=1 if the vacancy is due to a new activity; =0 otherwise	4004	0.105
demand increase	=1 if the vacancy is due to a demand increase; =0 otherwise	4004	0.317
reorganisation	=1 if the vacancy is due to a reorganization; =0 otherwise	4004	0.112
Type of vacancy			
executive	=1 if the vacancy is for an executive position; =0 otherwise	4004	0.164
short-term job	=1 if the vacancy is for a temporary position; =0 otherwise	4004	0.333
part-time job	=1 if the vacancy is for a part-time position; =0 otherwise	4004	0.179
urgent recruitment	=1 if the recruitment is urgent; =0 otherwise	4004	0.529
Previous recruitment methods			
pubagen_p	=1 if public agencies were used in a previous search; =0 otherwise	4004	0.340
privagen_p	=1 if private agencies were used in a previous search; =0 otherwise	4004	0.152
cand_100	=1 if more than 100 direct applications were received; =0 otherwise	4004	0.322
Macroeconomic context			
difficulties	=1 if the firm has financial problems; =0 otherwise	4004	0.278
Jobseekers_nb	= number of jobseekers in 2005 in the firm's sector Source: Enquête Emploi, INSEE, 2005	4004	254,285
offers_nb	= number of job offers in the firm's sector in the first half of 2005 Source: ANPE, 2005	4004	167,229
offers_evol	= change in the number of job offers in the firm's sector in the first half of 2005 Source: ANPE, 2005	4004	4.449

Appendix 2: Recruitment strategies and hiring success rates

n°	Recruitment strategies	Percentage of firms using the strategy	Success rate (%)
1	Professional networks (Prof. Netw.)	6.7	94.0
2	Public agencies (Pub. Ag.)	4.1	87.9
3	Private agencies (Priv. Ag.)	4.0	91.8
4	Market methods (Mark. Meth.)	10.0	92.0
5	Personal networks (Pers. Netw.)	2.2	95.5
6	Prof. Netw. + Pub. Ag.	1.5	88.1
7	Prof. Netw. + Priv. Ag.	2.9	93.9
8	Prof. Netw. + Mark. Meth.	8.9	91.5
9	Prof. Netw. + Rel. perso.	3.8	96.0
10	Pub. Ag. + Priv. Ag.	1.0	92.8
11	Pub. Ag. + Mark. Meth.	7.7	86.1
12	Pub. Ag. + Pers. Netw.	0.4	100.0
13	Priv. Ag. + Mark. Meth.	4.8	89.6
14	Priv. Ag. + Pers. Netw.	0.1	100.0
15	Mark. Meth. + Pers. Netw.	1.8	95.9
16	Prof. Netw. + Pub. Ag. + Priv. Ag.	0.9	91.4
17	Prof. Netw. + Pub. Ag. + Mark. Meth.	5.7	83.8
18	Prof. Netw. + Pub. Ag. + Pers. Netw.	0.8	84.4
19	Prof. Netw. + Priv. Ag. + Mark. Meth.	5.3	88.1
20	Prof. Netw. + Priv. Ag. + Pers. Netw.	0.7	89.7
21	Prof. Netw. + Mark. Meth. + Pers. Netw.	5.8	90.5
22	Pub. Ag. + Priv. Ag. + Mark. Meth.	4.6	82.7
23	Pub. Ag. + Priv. Ag. + Pers. Netw.	0.1	83.3
24	Pub. Ag. + Mark. Meth. + Pers. Netw.	1.0	85.0
25	Priv. Ag. + Mark. Meth. + Pers. Netw.	0.3	90.9
26	Prof. Netw. + Pub. Ag. + Inter. priv. + Mark. Meth.	4.3	79.8
27	Prof. Netw. + Priv. Ag. + Mark. Meth. + Pers. Netw.	2.4	80.0
28	Prof. Netw. + Pub. Ag. + Mark. Meth. + Pers. Netw.	3.3	80.1
29	Prof. Netw. + Priv. Ag. + Priv. Ag. + Pers. Netw.	0.6	69.6
30	Pub. Ag. + Priv. Ag. + Mark. Meth. + Pers. Netw.	0.5	85.7
31	Prof. Netw. + Pub. Ag. + Priv. Ag. + Mark. Meth. + Pers. Netw.	3.8	78.5