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The structure of hiring and labour market tightness☆

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Abstract

This paper examines the structure of firms' hiring processes using Dutch data compiled from filled vacancies. If more than one employee is to be hired, firms may choose either to hire all their employees at one time (instantaneous hiring) or to hire them over a longer period of time (gradual hiring). We find that 56% of the employees are hired at one time. Furthermore, a tightening of the labour market leads to a decrease in the probability of all employees being hired at one time.
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1. Introduction

Although the discussion on the structure of labour adjustment is more than a decade old, it is still a widely debated topic in the literature on labour demand. One of the main issues is whether firms' adjustments of labour are lumpy, or whether they occur gradually. While not all movements of labour are instantaneous (Cooper and Willis, 2001; Sakellaris, 2001), a number of important models of employment changes are based on the assumption of instantaneous labour adjustment (e.g. Caballero et al., 1997). Furthermore, little insight has been gained into the relationship between the structure of labour adjustment and labour market tightness. In tight (slack) labour markets with excess demand (supply) of labour, employers are more (less) constrained by the scarcity of labour. This suggests that it is harder for employers to hire instantly in tight markets.

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This paper deals with both issues by addressing the following empirical questions. How prevalent is instantaneous hiring? Is there any relationship between the structure of hiring and labour market tightness?

2. Theory

The employment changes in a firm are rather complex because of the wide range of types involved in worker turnover. In this paper we will only focus on the inflow (or hiring) of new employees. Basically, there are two types of adjustment mechanism, which differ because of a different underlying cost function. Non-convex hiring costs lead to instantaneous (or lumpy) adjustment towards the optimal level of labour. There are periods of unchanged labour, which will be longer for higher hiring costs. Furthermore, the size of the employment shocks will become larger for higher hiring costs (Hamermesh, 1989; Pfann and Verspagen, 1989). On the other hand, convex hiring costs result in gradual movements of labour, so that the inflow of employees into firms is smoothed out over a longer period. Hamermesh (1992) and Rota (1994) find evidence of both gradual and instantaneous adjustment.

Labour demand studies have detected instantaneous labour adjustment using monthly (or weekly) time-series firm-level data. Inter-temporal aggregation may contaminate these data, which could have serious consequences, since a gradual change within this period may be misinterpreted as an instantaneous change. Ideally, one would need daily information on the number of hires. In our study, we have used a different type of data set that may render a more precise measurement of immediate and gradual hiring. We make use of elapsed vacancy durations, the duration of which is measured in days. Let us suppose a firm recruits at least two applicants for a homogeneous function. Let $\text{Vacdur}_{\min}$ be the duration at which the first applicant is hired and $\text{Vacdur}_{\max}$ the duration at which the last applicant is hired. The type of hiring may be revealed by the difference between both durations:

$$\begin{aligned} &\text{Vacdur}_{\min} = \text{Vacdur}_{\max} \quad \text{then instantaneous hiring} \\ &\text{Vacdur}_{\min} \neq \text{Vacdur}_{\max} \quad \text{then gradual hiring} \end{aligned} \tag{1}$$

The firm hires instantaneously only if the minimum and maximum durations are equal. We will use (1) as our measure of instantaneous and gradual hiring in our empirical analysis.

3. Data

We derived our data set from a survey by the Dutch Ministry of Social Affairs and Employment on the recruitment behaviour of Dutch establishments. In the sequel, we denote these establishments as firms. The survey, entitled ‘How do Firms Recruit?’, was carried out by telephone every 2 months. However, the survey is not a panel because a new sample is randomly drawn on each occasion. Each firm provided detailed information on all aspects of the hiring process of one function only. This function may consist of multiple homogeneous jobs with the same job requirements (for instance with

respect to educational level). Thus, for one function we may observe various vacancies, all of which are posted at the same moment by the firm.

Firms from all economic sectors (the government excluded) were randomly selected. Personnel responsible for recruitment were asked whether the final vacancy for some function had been filled in the 2 months prior to the interview.[1,2] If there were multiple vacancies for this function but some were still unfilled at the time of inquiry, the firm was excluded from the sample. The duration of the vacancies filled may be longer than 2 months. If the firm had filled all the vacancies for a function, both the time-span (in days) until the hiring of the first worker and that of the last worker were registered. These variables we refer to, respectively, as the minimum and maximum vacancy duration. With respect to sampling, there were no limitations on the difference between both durations. Using the information on the minimum and maximum duration, we determined whether hiring is gradual or instantaneous (Eq. (1)). Instantaneous hiring is not under-sampled. The probability of being sampled does not depend on having an open vacancy, but depends rather on having hired someone in the past 2 months (it is a flow sample, a sample from the outflow from the stock of vacancies). The probability of terminating a recruitment procedure in any of the sampling periods does not depend on the length of the recruitment procedure.

Our data set spans the years 1995–1998 and includes information from 17 368 firms that hired employees. No use was made of the data on the hiring of single employees, as a distinction between instantaneous and gradual hiring could only be made when more than one employee is hired. Our net sample consists of 5742 firms. As the location of these firms was known, we were also able to take regional variations in unemployment and vacancy rates into account.

The Dutch labour market tightened substantially over the period 1995–1998. This is reflected in a steady decline in the Dutch unemployment rate from 8.5% in 1995 to 6.4% in 1998. The vacancy rate doubled from 0.9% in 1995 to 1.8% in 1998 (Table 1). Both rates will be used as proxy variables for the regional labour market tightness in Section 4. The regions are divided into 12 provinces, which is a good approximation of the search area of most applicants (Gorter and Van Ours, 1994).

Table 1
Dutch unemployment and vacancy rates (1995–98)

Year	Unemployment rate (%)			Vacancy rate (%)		
	Average	Minimum	Maximum	Average	Minimum	Maximum
1995	8.46	7.05	11.01	0.93	0.45	1.36
1996	8.08	6.67	9.57	1.01	0.51	1.41
1997	7.39	5.96	11.84	1.33	0.51	1.99
1998	6.41	5.03	9.48	1.83	0.67	2.72

Source: Netherlands Central Bureau of Statistics.

[1] If the hiring process has been completed for several functions, one function is selected randomly by the firm which then provides detailed information on the hiring process for this function only.

[2] A duration elapses when both parties have agreed on the labour contract.

Table 2
Descriptive statistics

Variable	Mean	S.D.	Minimum	Maximum
Shock (gradual hiring = 0; instantaneous hiring = 1)	0.56	0.50	0	1
Minimum vacancy duration of gradual hiring[a] (days)	22.82	24.62	0	360
Maximum vacancy duration of gradual hiring[a] (days)	42.86	42.85	0	720
Vacancy duration of instantaneous hiring[b] (days)	27.01	37.96	0	500
Firm size (employees)	201.14	346.86	2	5500
Number of hires (employees)	4.69	6.98	2	140
Number of observations	5742			

[a] Based on 2550 observations.
[b] Based on 3192 observations.

4. Empirical analysis

How important is instantaneous hiring? We found that 56% hired instantaneously (Table 2). This number is remarkably low, given the analysis of Cooper and Willis (2001), which questioned the claim of Caballero et al. (1997) that all movements in employment are instantaneous.

What is the impact of labour market tightness on the probability of instantaneous hiring? We estimated a Probit model for which the dependent variable measures the structure of hiring (gradual hiring = 0; instantaneous hiring = 1). We approximated labour market tightness by the regional vacancy and unemployment rates. The year dummies may also reflect some of the impact of labour market tightness. The control variables are the economic sector (six dummy variables), the minimum educational level of the hired workers prior to the vacancy (six dummy variables), other workers' requirements (experience, type of contract, and maximum age), firm size, and the hiring rate. See Table 2 for the descriptive statistics of the main variables.

Table 3 shows the estimated marginal effects of a Probit regression for two specifications. In the first column, year dummies pick up labour market tightness. The estimates indicate that the probability of instantaneous adjustment is 3.7% higher in 1995 than in 1998. It reflects the impact of tightening on the way firms hire their employees.

The second column of Table 3 unravels the tightness still further by including cross-effects in time and the regional vacancy and unemployment rates, respectively. The vacancy rate, as well as its cross-effect with time, picks up all the effects of labour market tightness, since the unemployment rate variables have no effect on the probability of instantaneous adjustment. According to the estimates, a 1-percentage point increase in the vacancy rate decreases the probability of instantaneous adjustment by 11.1 percentage points. On top of that, there is an annual decrease in the effect by 5.2 percentage points.

5. Conclusion

We have provided evidence of the impact of labour market conditions on the structure of hiring. Instantaneous labour adjustment implies that firms wait until they have enough vacancies so that they can benefit from scale effects by hiring all employees at one time. Our estimates imply that firms do not necessarily get the type of labour adjustment they wish. Due to a lack of supply of employees,

Table 3
Probit regression (dependent variable is 1 if instantaneous adjustment)

Variable	Marginal effect	*t*-value	Marginal effect	*t*-value
Job requirements				
Dummy experience	−0.007	−0.49	−0.007	−0.50
Dummy permanent contract	−0.045	−3.03	−0.039	−2.66
Dummy maximum age	−0.042	−2.25	−0.043	−2.30
Year[a]				
Dummy 1995	0.037	1.94	0.336	1.63
Dummy 1996	0.014	0.68	0.197	1.47
Dummy 1997	0.028	1.52	0.115	1.69
Log (Firm size)	−0.004	−0.69	−0.003	−0.47
Log (Hires)	−0.347	−9.32	−0.348	−9.33
Log^2 (Hires)	0.060	6.06	0.060	6.08
Regional tightness				
Regional vacancy rate	–		−0.111	−3.22
Regional unemployment rate	–		0.009	0.91
$t \times$Regional vacancy rate[b]	–		−0.052	−2.29
$t \times$Regional unemployment rate[b]	–		−0.012	−1.46
Number of observations	5742		5742	

Coefficients on economic sector (six dummy variables) and job requirements for education (six dummy variables) are not reported.

[a] 1998: reference year.

[b] $t=1$ for 1995.

firms have to search harder before they reach the right (number of) employees, which reduces the probability of instantaneous hiring. In other words, the specification of the adjustment cost function depends on the state of the labour market. Consequently, with pro-cyclical frictions in the labour market, the nature of labour adjustment varies over time.

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