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The costs of hiring and separations

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Abstract

In this article, we use the structure of French labor law and the data from three linked sources to estimate the costs of hiring, separation and retirement of employees for a representative sample of French establishments matched with a representative sample of their employees. The estimates are computed using data from the Wage Structure Survey (ESS), the Workforce Movement Questionnaire (DMMO), and the Occupational Structure Survey (ESE). We show that the estimated separation costs are increasing and mildly concave functions of the number of exits and include a very large fixed component. Estimated hiring costs are much lower and those associated with short-term contracts are effectively zero. Profit maximizing French firms should adjust employment primarily through hiring changes.

JEL classification: J30; D21
Keywords: Hiring; Separations; French labor law

1. Introduction

We begin at the intersection of dynamic labor demand analysis and the study of the firm's cost functions (initiated in Oi, 1961). The firm's economic problem is the following. Facing economic shocks, the firm must decide to hire or to terminate some workers. To compute the optimal decision, for example the number of terminations, the firm must take into account different types of costs and benefits: past hiring costs, past training costs (both of which are sunk), termination costs, total compensation, and marginal productivity. In the United States, the arrival of a negative demand shock causes the establishment to

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immediately reduce employment through increased separations (Anderson and Meyer, 1994; Davis and Haltiwanger, 1992). The laidoff workers enter unemployment; the existing unemployed workers exit at the same rate as before the shock; hence, the rate of unemployment increases (Abowd and Zellner, 1985; Blanchard and Katz, 1997). Evidently, the cheaper form of adjustment in the US is to fire the employees, even though there are no direct estimates of these costs. In France, the arrival of a negative demand shock causes the establishment to immediately reduce hiring—in particular, to eliminate the hiring of employees on fixed duration contracts (Abowd et al., 1999a). The reduction in hiring rates slows the exit from unemployment without changing the entry rate and, hence, the unemployment rate increases.

Because the set of French employment responses is less familiar to most readers, we summarize the relation between establishment size change (employment growth) and the rates of entry and exit of workers in Fig. 1. In Appendix A.1, we show additional details of the adjustments by type of employment contract. Fig. 1 shows that over almost the entire range of employment growth rates, positive and negative; the rate of entry of workers is increasing and the rate of exit of workers is constant. The institution associated with this type of employment mobility in France is the fixed duration employment contract, which we discuss in detail below. Since more than 70% of all employment transactions in 1992, the year of our data analysis, involved short-term contract employees, we believe that the structure of adjustment costs, and the nature of the associated employment institutions, in France must be substantially different from those of the United States. Furthermore, we believe that the French institutions may be more typical of European institutions and, therefore, are of considerable scientific interest because differences in the optimal response to demand shocks arise precisely because of the differences in institutional settings. A

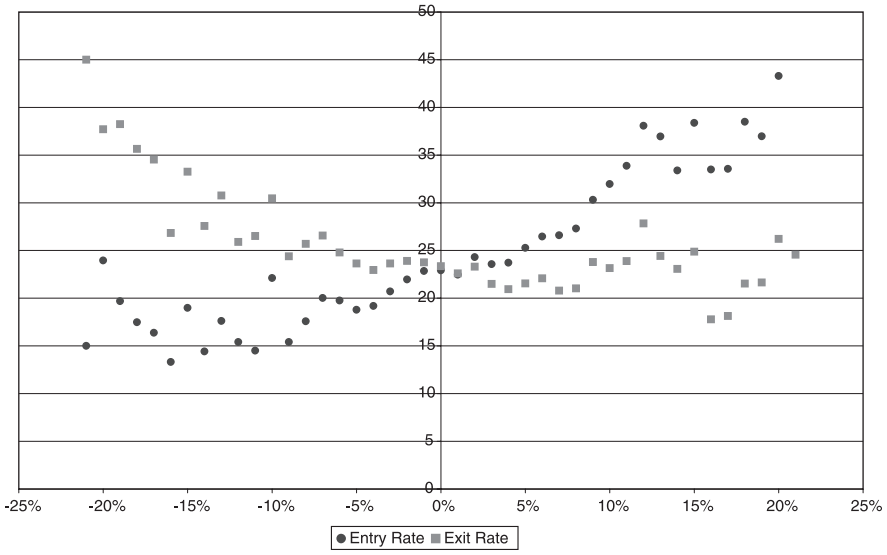

Fig. 1. Exit and entry rates vs. establishment growth rate.

reasonable working hypothesis for France, and for much of Europe, is that hiring-related adjustment costs are much lower than separation-related adjustment costs. In this article, we directly address this hypothesis by measuring and modeling the costs of adjustment in a cross-section of French establishments.

Once the firm decides to terminate some of its workers or to hire new workers, we observe the associated costs directly. We analyze these costs in terms of both variable and fixed adjustment costs using a cost function in which the explanatory variables are (1) the number of workers that entered or left the firm (variable part) and (2) a fixed cost paid whenever some workers were hired or terminated. In addition, for a sample of terminated workers, we directly observe the severance payment or the retirement bonus and individual characteristics. The direct payments to the workers differ from the total termination or retirement costs per separation because of indirect, but measurable, costs associated with restrictive French employment laws. Our ability to measure both types of termination costs allows us to examine the selection process of the terminated workers and the structure of the costs in terms of the individual observable variables. Finally, we observe the size of the personnel department which gives us a measure of other types of costs induced by human resource management, although we do not have any direct measure of the foregone output component of adjustment costs.

We estimate the costs of hiring, separation, and retirement for a representative sample of French establishments matched with a representative sample of workers employed in those establishments. The data were collected in 1992. We compute establishment-based estimates using French data from three matched sources. The first source is the Wage Structure Survey (ESS), which provides the establishment measures of the hiring and firing costs. It also provides, for some establishments, the employment and the number of new hires and separations. For units where this information is missing, we match data from the Workforce Movement Questionnaire (DMMO), which gives, for every establishment with at least 50 employees, the number of new hires and separations in 1992. Finally, we match data on the establishment personnel department from the Occupational Structure Survey (ESE). Individual-based estimates are computed using the employee part of the Wage Structure Survey, which provides individual-level information on wages, skills, worker characteristics, and severance payments or retirement bonuses for a probability sample of workers in each establishment.

Our results show that the establishment-based adjustment costs of separations are an increasing and mildly concave function of the number of retirements and an increasing and mildly concave function of the number of terminations. In addition, the fixed cost component is a large part of the total adjustment costs paid when there are separations. Termination or retirement costs act as fixed costs of adjustment for at least two reasons: concavity of the cost function and the fixed cost to be paid when terminations take place. Firms should bunch separations, not do them gradually. Furthermore, the fact that optimal separations are lumpy implies that the sample of establishments with positive observed separations will not be representative of all establishments at risk to separate workers. Our estimated models account for this selection bias. The fixed costs of hiring are of much lower magnitude than those for separations. Except for highly skilled workers on long-term contracts, there are no variable hiring costs. The working hypothesis is, therefore, confirmed by the data analysis.

We also show that the individual-based estimated retirement or firing costs consist primarily of a fixed component and are only mildly related to the variable part of the legal formula (i.e., a proportion of the person's wage that varies linearly with seniority). These results are consistent with the establishment-level results.

In Section 2, we give the salient details of the laws and institutions of the French labor market. Section 3 summarizes our data. In Section 4, we present the theoretical and statistical models that motivate our specifications. The results of the empirical analysis are in Section 5. Finally, we conclude and relate our findings to the growing interface between empirical labor economics and the macroeconomics of employment flows and unemployment.

2. Firing: the French labor laws

Since 1979, French labor law has recognized two types of regular employment contracts: fixed duration contracts (CDD, contrat à durée déterminée), which contain a specified employment start date, end date and remuneration, but have restricted use (see Abowd et al., 1999a), and indefinite duration contracts (CDI, contrat à durée indéterminée), which are the normal form of contract and which limit the employer's right to terminate the employee as described below. Although their use is formally restricted, CDDs are the more common method of hiring.

Since 1982, employment contracts have all been CDI unless the employee and job qualify for a CDD. Short-term employment contracts existed prior to the legal changes in 1982; however, the designation of a contract type was less important because the CDI were not the default contracts. As defined in the text of the law (Article L.122), a CDD cannot be used to fill a job that would exist under normal and permanent business conditions for a given firm. Hence, in principle, a CDD can only be signed for a temporary and precise task (replacement in case of absence, temporary or seasonal demand shock). Such contracts are also used for youth employment programs. Furthermore, selection and testing of future permanent employees is allowed under such contracts. The contract can only be renewed once and its length, including renewal, cannot exceed 18 months (24 months for youth employment programs). At the termination of the contract, the worker receives a 6% severance payment by law. For example, in 1992, 80% of all entries into private for-profit or quasi-public establishments were through CDD. On the other hand, at the same point in time, more than 90% of the stock of employees in these same establishments were on CDI. For those hired under CDD, approximately one in three is eventually converted to CDI (Abowd et al., 1999a).

Termination of a CDI is a more complex process. Employer-initiated termination of a CDI employee can take two broad forms-firing (licenciement) for economic reasons or for cause and early or normal retirement (préretraite and retraite), both of which are considered terminations under French Labor Law (30 July 1987).[1] Firing for cause under French Labor Law can take two forms—firing for "serious reason" or for "very serious

[1] This section heavily borrows from Lamy Social (1992).

misconduct.'' The latter exempts the employer from paying a severance payment and we have no information on this type of termination. For all other types of terminations and for retirements, the employer must observe a mandatory notice period and pay a severance payment. An employer can initiate a mandatory retirement of a worker if that person is currently eligible to receive the full pension paid by the Social Security System; that is, if the worker has been employed in a covered job for at least 37.5 years and is at least 60 years old or if the worker has been employed less time (the exact amount varies) in a covered job but has reached the age of 65, the mandatory retirement age in most industry-level collective agreements (conventions collectives). Retirement timing is, thus, an employer decision or, at the least, a joint employee–employer decision. The mandatory notice period for retirement must be at least as long as that for economic terminations and the severance payment must also be at least equal to the severance payment given in case of economic termination.

Terminations for economic reasons can affect both individual workers and groups of workers. All terminated workers benefit from a reemployment priority within the same firm for 1 year after the termination date. Valid economic termination reasons include: destruction of the worker's job, transformation of the worker's job, and major modification of the labor contract without a change in the job—leading to termination if the worker refuses to sign the new contract. Major modifications of the job occur when, because of bad business conditions or because of technical change within the firm, existing jobs must be reengineered to fit the new circumstances. Technical transformations of the job do not necessarily entail a decrease in total employment or the wholesale replacement of workers whose skills are obsolete with new workers whose training is better suited to the redesigned job.

Because different rules apply to individual and collective terminations, we discuss both in turn. For individual terminations, the employee must be notified in writing of the termination and its justification. Although the employer need not inform the personnel delegate (elected representative of the employees to the comité d'entreprise), the administrative authority (Direction du Travail) at the Ministry of Labor must be informed. The administrative authority cannot block the termination unless there has been a procedural error. Before the termination, the employee has the right to an exit interview. If a retraining program is offered, the details must be given in the exit interview. This procedure takes at most 3 weeks. Retraining programs may be tailored to individual needs and are arranged jointly by the firm, the quasi-governmental agency that administers the unemployment insurance system, and the national government. The firm pays 4500 FFr per worker for the retraining program.

There are several types of collective terminations; the first category distinguished by French labor laws is the collective termination of less than 10 workers during a 30-day period. Most steps in this procedure are similar to those described above. The employer must consult the personnel delegate or the union representatives at the firm. The employer must notify the employee and the Ministry of Labor in writing. Each worker has the right to an exit interview at which the employer may offer a retraining program, as described above for individual terminations.

The second category of collective terminations concerns the dismissal of at least 10 workers during a 30-day period. The 2 August 1989 law requires that firms with 50 or more employees formulate a ''social plan'' before implementing a collective termination of this magnitude or greater. This social plan must place a limit on the total number of

terminations and lay out plans to facilitate reemployment of terminated workers. The plan may also offer a retraining program, just as the collective terminations noted above did. Union representatives or personnel delegates and the departmental director of the Ministry of Labor must also be informed of the plan. Two public meetings of the works council (comité d'entreprise) must be organized with an interval between the meetings of 2–4 weeks depending upon the number of terminations proposed. The works council may require the firm to hire a consulting accountant (at the company's expense) to help the council with its analysis. During this period, the departmental director of the Ministry of Labor must be continuously informed of the proceedings, the plan, and the names of the proposed terminated workers. The Ministry is responsible for enforcing the procedure but cannot block the terminations if the correct procedures have been followed. The Minister has 1 month to confirm the procedural correctness of the collective termination. Besides documenting irregularities, the departmental director may also suggest changes to the social plan. In all other regards, the rules governing large-scale collective terminations are the same as those noted above for smaller collective terminations.

For all terminations, regardless of the number of employees involved, the rules governing the mandatory notification period are as follows. The notification period is the delay between the worker's formal letter announcing the termination and the actual end of the CDI. Workers with less than 6 months seniority are not given notice. For workers with 6 months to 2 years seniority, the notice period is 1 month. The notice period is 2 months for workers with more than 2 years of seniority. For engineers, professionals, and managers (cadre), the notice period is 3 months. If the notice period is not respected, the worker must be fully compensated for the difference between the minimum notice period and the delay actually experienced in the termination. There are, however, no punitive damages.

Severance payments are calculated as follows. Unless the sector collective bargaining agreement, the firm-level collective bargaining agreement, or the individual contract specifies a more generous formula, the legal minimum severance payment must be paid to workers with at least 2 years of seniority. For every year of seniority at the firm, the employer must pay 20 h if the worker is paid by the hour or 1/10 of the reference wage if the worker is paid by the month. The reference wage is computed as the average monthly wage over the last 3 months of service at the firm. Furthermore, for most workers, an additional 1/15 of a second monthly reference wage must be added for every year of service beyond 10. This second reference wage is the maximum of the first reference wage and the average wage over the last 12 months.

When terminated workers would not receive a full-rate retirement pension, early retirement may be an option for the firm in case of the terminations for economic reasons. Early retired workers must be at least age 55. The candidate worker must agree to the early retirement by signing a convention along with the employer and the French government. The convention requires that, in consideration of early payment of retirement benefits, the worker forfeits the difference between the minimum severance payment as stated in the sector collective bargaining agreement and the legal minimum severance payment. As a part of the early retirement package, the firm must pay a one-time supplement of at least 3% of the daily wage times the number of days the worker would have been paid under the collective bargaining agreement until retirement. Actual supplement rates, again specified in the early retirement agreement, lie between 6% and 8%. The quasi-governmental

agency that manages the unemployment insurance system (UNEDIC) pays approximately the same supplement to the early retiree. The early retirement payments end as soon as the worker reaches normal retirement age.

3. Data description

This section describes the three source surveys and our procedure for matching them.

3.1. The Wage Structure Survey

The first data set that we use was derived from the most recent wave of the French Wage Structure Survey (Enquête Structure des Salaires, ESS 1992). The Wage Structure Survey program, conducted jointly by the French National Statistical Institute (INSEE) and the Ministry of Labor, was initiated in 1966 by the European Statistical Office (ESO). However, after the 1966, 1972, and 1978 surveys, the ESS was abandoned by the ESO. INSEE decided to resume this survey given the usefulness and quantity of information collected during each wave. The 1992 ESS collects establishment wage information as well as individual wages (employees sampled within the establishment) for a sample of establishments in the manufacturing, construction, and (some) service industries. The sampling frame has two stages: at the first stage, production units are sampled; at the second stage, individuals employed at these sampled units are sampled. More specifically, the universe to be sampled includes all establishments (manufacturing) or firms (construction and service) with at least 10 employees. Agriculture, transportation, telecommunication, and the services supplied to households are excluded from the scope of the ESS. Insurance companies, banks, and all other industries where services are supplied to businesses are within the scope of the survey. The sampling frame is derived from the SIRENE system, a unified database recording all existing establishments and firms in France. The sampling rate is stratified according to the industry, region, and the size of the unit. Sampling rates vary from 1 (certainty) for the units above 500 employees to 1/48 for units between 10 and 20 employees.[2] The ESS provides the sampling frame for our subsequent analyses. The other data sources from which we added information to the ESS are exhaustive for establishments above 20 (ESE, see below) and 50 (DMMO, see below). Thus, establishments in the ESS with 10–20 are excluded from all of our analyses.

Data were collected on (1) the wage-setting policy of the establishment and (2) wages and characteristics of a representative sample of the individuals employed at this establishment in that year. We used most individual-level variables available in the ESS for every sampled worker, namely:

- total annual compensation inclusive of all employee- and employer-paid benefits and bonuses but exclusive of non-wage benefits,

[2] More detailed technical information on the 1986 version of the ESS is available in Rotbart (1991). For technical information on the 1992 ESS, see INSEE (1997).

- firm seniority,
- type of contract (CDI or CDD),
- number of days of employment in the establishment in 1992,
- sex,
- age,
- nationality (French or non-French),
- skill level (in four groups),
- bonuses for retirement,
- severance payments for workers that retired or were fired in 1992.

The survey distinguishes eight types of bonuses: fixed bonuses; bonuses for personal (not employment-related) events such as a wedding; compensating bonuses such as bonuses for job difficulty; bonuses based on firm performance; bonuses based on team performance; bonuses based on individual performance; bonuses for firm-specific and exceptional events; and legally mandated bonuses (primarily severance payments, retirement bonuses, and transportation bonuses). To measure the individual severance payment or retirement bonus, we use the legally mandated bonus category. The transportation bonus cannot exceed a few thousand French Francs in 1992; hence, we eliminate all bonuses in the category with an amount less than 5000 FFr. To distinguish severance payments from retirement bonuses, we assume, consistent with the law, that all bonuses paid to workers older than age 55 are retirement bonuses. We assume that all payments to workers below age 55 must be severance payments.

The basic research data files for the ESS contain 15,858 establishments with 148,976 interviewed employees in 1992. It is also possible to compute, for most of our establishments, within-establishment statistics on the distribution of wages and seniority. Hence, we computed the first decile, the first quartile, the median, the third quartile, and the ninth decile of both the wage and seniority distributions. Even though we do not know the wage or seniority of every retired and separated workers, these percentiles will be another way to capture components of the legally mandated payments (see Section 2). In addition, we use the following establishment-level variables:

- total employment: the average full-time monthly employment during the year 1992;
- total hiring, CDD: the number of employees hired on fixed duration, short-term contracts;
- total hiring, CDI: the number of employees hired on long-term contracts;
- total retirements: the number of employees retiring or taking early retirement;
- total terminations (economic reasons): the number of employees terminated for economic reasons during 1992 and reported separately for two groups—engineers, professionals, and managers (cadre), and all other workers;
- total terminations (other reasons): the number of employees terminated for cause during 1992 and reported separately for two groups—engineers, professionals, and managers (cadre), and all other workers;
- total terminations (all reasons): the sum of the two categories of terminations defined above;

- retirement costs: the sum of early retirement payments paid directly to employees and regular retirement compensation paid directly to the employees;
- severance payments: legally mandated separation payments discussed above plus any other payment made by the employer at separation;
- hiring costs: reported employer expenses on job advertising, search firm fees, and compensation of applicants as distinct from employees, explicitly excluding training of newly hired employees.

We also use the following training costs:

- training hours: the total number of hours of training paid by the firm when trainees were directly compensated by the firm, reported separately for engineers, professionals, and managers, and for all other workers;
- direct training costs: employer paid training expenditures exclusive of trainee labor costs and inclusive of payroll costs for instructors as well as all other direct material costs, such as the rental of equipment and space;
- trainees' compensation (young): the direct labor costs (total compensation) for young trainees (stagiaires, apprentis, and others);
- trainees' compensation (others): all other trainees' direct labor costs (total compensation).

All costs are reported in 1992 French francs. All compensation costs mentioned above are inclusive of employer-paid payroll taxes and employee-paid payroll taxes but exclude employer paid benefits that are not covered by the payroll taxes. We divide the total compensated training time by the number of workers in each of the two skill groups to get a ''training time per new hire'' measure. As a measure of the annual full time wage rate, we define average labor costs per employee as the total wage bill reported in the ESS (inclusive of all payroll taxes and all employee and employer paid benefits) by the total employment. Finally, we use the ESS business environment variables, asked of the responding manager at every establishment or firm:

- business conditions in that year: good, normal, or bad;
- business conditions during the last 5 years: good, normal, or bad;
- expected change of employment: stable, increasing, decreasing.

3.2. The workforce movement questionnaire

Our second data source was the Monthly Worker Movement Report (Déclaration Mensuelle de Mouvement de Main-d'Oeuvre, DMMO), which is an administrative record of all worker movements at all establishments with at least 50 employees. Although this administrative report was created in the 1970s as a part of the government's monitoring of employee terminations, it was first computerized in 1987 for all of France. Each establishment with at least 50 employees must report for each employment movement: (1) the nature of the transaction—(a) hire on a long-term contract (CDI), (b) hire on a short-term contract (CDD), (c) trial hire, (d) transfer in, (e) transfer out, (f) quit, (g) exit for military service, (h)

exit for sickness or death, (i) end of short-term contract, (j) end of trial hire, (k) retirement and early retirement, (l) termination for economic reasons, and (m) other terminations including for cause; (2) the skill level of the job involved (two-digit occupational code, CS); and (3) the age and seniority of the employee involved. For this study, we created a working file in which the data were summed to the annual level by skill group aggregates for each establishment. The variables used in our analysis were:

- total hiring on CDI is the number of long-term contract hires;
- total hiring on CDD is the number of short-term contract hires;
- total retirements is the number of regular and early retirements;
- total terminations (economic reasons) is the number of terminations for economic reasons as defined in Section 2.

The DMMO working file contains information for 38,592 establishments (private and quasi-public) for 1992.

3.3. The occupational structure survey

Our third data source is the 1992 Occupational Structure Survey (Enquête sur la Structure des Emplois, ESE), which is an annual administrative data base of the detailed occupational structure for all establishments with at least 20 employees. All establishments from the private or market-oriented public sector (établissement public industriel et commercial, EPIC) with at least 20 employees on 31 December 1991 had to complete a questionnaire. The establishment reports a description of its occupational structure using a four-digit standardized classification of occupations. From this classification, we defined the following variables:

- clerical worker (personnel department) are all clerical workers (secretaries, assistants, etc.) employed in personnel or legal departments;
- supervisors (personnel department) are all administrative technicians (compensation specialists, benefits specialists, bookkeepers, etc.) and supervisors employed in personnel or legal departments;
- professionals, managers (personnel department) are all professionals (lawyers, MBAs) and managers (human resource managers, personnel directors, compensation managers, benefits managers, etc.) employed in personnel or training departments.

These occupational categories constitute all of the directly identifiable employees in an establishment's personnel or human resource management department. The basic ESE file contains the number of workers employed in these three occupations for 99,904 establishments on 31 December 1991.

It is worth noting that most of the specialized cost and administrative information reported in the ESS is known by the firms because of the legal regulations surrounding the employment relation that we discussed in Section 2. The French training laws specify that all firms with 10 (20 in some cases) or more employees must spend a proportion of their wage bill for continuing in-service training (see Delame and Kramarz, 1997). This

proportion increased from 1% at the beginning of the 1980s to 1.2% at the end of the decade to 1.4% in 1992. The flow data on entries and exits must be declared in the DMMO. The hiring and firing costs are regulated by the laws discussed above. Finally, most of these costs are subject to special tax treatment and must, therefore, be accounted separately from other direct costs.

3.4. Creation of the matched data file

We matched our three source surveys by establishment. In the matched file, we required the establishment to be in both the Wage Structure Survey (ESS) and in the Occupational Structure Survey (ESE). Some establishments do not appear in the DMMO so that all variables are missing from this source. There were 7905 ESS establishments matched. All matched establishments have observations in both the ESS and the ESE. This eliminates all establishments with 10–20 employees from the analysis. We did not require that the establishment have a record in the DMMO because we use the DMMO to replace missing data in the ESS and ESE as described below.

For those establishments with no data on total employment from the ESS, we used the available information from the DMMO (average of employment on January 1 and employment on December 31 of the same year). We adopted equivalent procedure for the following variables: total hires, total separations for economic reasons, and regular or early retirements: if the data were not available in the ESS, then, we used the figures from the DMMO. Furthermore, when total hires, total separations and retirements were available, but their disaggregation by skill—(a) engineers, managers, and professionals or (b) all other categories—was missing, we imputed the values by skill levels by multiplying the aggregate variable by the respective shares in these two skill levels in the establishment as declared in the DMMO. Finally, we used the data on entry by type of contract—short-term (CDD) or long-term (CDI)—only for those establishments with non-missing data. Table 1a shows the number of available observations for each variable from the firm-level data and Table 1b gives the number of observations for each variable from the individual-level data. The number of observations used in the different regressions is shown in Section 5.

The issue of the representativeness of our ESS analysis data set can be addressed by comparing the information in the full sample (15,606 establishments) with the data in our analysis sample (7905 establishments). Average employment in the full ESS is 124.1 (S.D.: 484.4), whereas average employment in the matched ESS is 195.8 (S.D.: 595.6). Our establishments are larger and more variable, on average, for two reasons. First, establishments with 10–20 employees in the ESS are out of scope for the ESE, and have been excluded from our analysis. Second, we require confirming information on the hiring and separation activity and costs either in the ESS or in the DMMO. If an establishment reports no hiring activity and no hiring costs in the ESS and reports no hiring activity in the DMMO, the establishment stays in our sample with a value of zero for these variables. Otherwise, if the establishment reports no hiring activity and no hiring costs in the ESS but positive hiring in the DMMO, the establishment is dropped from the analysis file because we do not have the required cost information. If an establishment reports positive costs but no hiring activity in the ESS or DMMO, then the establishment is also dropped from our

Table 1a
Summary statistics for the establishment-level variables

Variable	Number of observations	Mean	S.D.
Total employment	7905	195.8	595.6
Total hiring	4255	61.8	128.9
Total hiring (excludes zeros)	4060	64.8	131.2
Total hiring (engineers, professionals, managers "cadres")	4165	8.0	26.4
Total hiring (others)	4479	40.3	103.2
Total retirements	3844	3.9	13.0
Total retirements (excludes zeros)	2084	7.2	17.0
Total retirements (engineers, professionals, managers)	3777	0.7	3.1
Total retirements (others)	2749	3.9	10.9
Total terminations (all reasons)	3809	11.1	44.8
Total terminations (economic reasons, excludes zeros)	1133	19.8	66.0
Total terminations (all, excludes zeros)	2845	15.0	51.3
Total terminations (all, engineers, professionals, managers)	3668	1.9	8.4
Total terminations (all, others)	2215	11.1	41.3
Clerical workers (Personnel Department)	7905	0.81	6.88
Supervisors (Personnel Department)	7905	0.84	5.42
Professionals, managers (Personnel Department)	7905	0.30	3.48
Retirement costs per retiree	1487	134,011	1,087,370
Termination costs per termination (economic reasons)	982	214,828	587,309
Termination costs per termination (all)	2027	95,531	233,029
Hiring costs per hire	1562	5560	26,240
Training hours per engineers, professionals, managers	7353	86.2	2037.2
Training hours per others	7341	68.0	2403.6
Direct training cost per worker	7896	3025.1	64,686.7
Trainees' compensation (young, per worker)	7896	458.4	11,997.5
Trainees' compensation (others, per worker)	7896	1459.1	29,427.5
Good business conditions (%)	7905	4.2	
Bad business conditions (%)	7905	31.4	
Average labor costs	7896	171,022	676,185
Within-firm wage distribution (first decile)	7666	7.206	0.470
Within-firm wage distribution (first quartile)	7666	7.409	0.547
Within-firm wage distribution (median)	7666	7.901	0.693
Within-firm wage distribution (third quartile)	7666	8.438	0.679
Within-firm wage distribution (ninth decile)	7666	8.716	0.598
Within-firm seniority distribution (first decile)	7662	2.831	4.204
Within-firm seniority distribution (first quartile)	7662	4.612	5.055
Within-firm seniority distribution (median)	7662	8.965	6.678
Within-firm seniority distribution (third quartile)	7662	14.563	8.222
Within-firm seniority distribution (ninth decile)	7662	18.093	9.157
Growing firm (%)	7903	45.8	
Shrinking firm (%)	7903	21.2	

Sources: ESS 1992, ESE 1992, DMMO 1992.

analysis file because we do not have the required number of new hires. Similar rules were applied for the separation data.

We consider next a more detailed analysis of the 15,606 establishments in the full ESS and their disposition after the match with the DMMO. Of the original ESS

Table 1b
Summary statistics for individual-level variables

Variable	Number of observations	Mean	S.D.
Fired workers			
Managers, engineers, professionals (%)	1705	16.4	
Clerks (%)	1705	17.9	
Blue-collar workers (%)	1705	36.0	
Technicians, foremen (%)	1705	29.7	
Male (%)	1705	69.5	
French (%)	1705	94.7	
Age	1705	37.8	8.4
Seniority	1705	10.1	8.2
Severance payment	1705	18,732	28,990
Wage (10^6 FFr) × seniority	1705	1.69	1.91
Log of annual wage	1705	12.0	0.6
Wage residual ε_i	1705	0.140	0.369
Retired workers			
Managers, engineers, professionals (%)	404	16.4	
Clerks (%)	404	20.8	
Blue-collar workers (%)	404	36.0	
Technicians, foremen (%)	404	26.8	
Male (%)	404	67.5	
French (%)	404	92.8	
Age	404	59.2	2.5
Seniority	404	22.6	11.2
Retirement bonus	404	42,324	67,566
Wage (10^6 FFr) × seniority	404	4.26	4.19
Log of annual wage	404	12.2	0.8
Wage residual ε_i	404	0.272	0.521

Source: ESS 1992.

establishments, 3886 can be matched to the DMMO and 11,720 cannot be matched with the DMMO. Among those that can be matched to the DMMO, the average employment is 340 employees. Furthermore, 90% of these firms have at least 50 employees. Recall that it is technically possible that some firms with less than 50 employees respond to the DMMO (for instance, if a multi-establishment company sends a form for all of its establishments). Among those that cannot be matched average employment is 52 with an extremely skewed distribution since the employment at the establishment at the 90th percentile of this distribution is 49, i.e., just below the threshold for responding to the DMMO. Hence, 90% of the non-matching firms do not have to respond to the DMMO and are, therefore, usually excluded from the sample even though some of them do provide data, as mentioned above. Of the 1118 establishments with at least 50 employees that could have responded to the DMMO but did not (recall that firms only respond when there is at least one hire or one separation in the year, otherwise no declaration is required), we see that 75% have no recruitment or separation cost, hence, probably no hiring or separation. Of those which declare some hiring or separation in

the ESS (recall that this is possible in the ESS questionnaire, in which firms where asked entries and exits even if they did not respond to the DMMO), roughly 50% also declare the associated costs.

Another issue, which may explain absence of some large establishments, is the following. Multi-establishment firms have the opportunity to send a unique file with either each establishment (the normal procedure) or with all establishments aggregated. Discussion with the persons in charge of the ESS sources at INSEE reveal that there is no apparent and systematic pattern to the reporting (INSEE, 1997). In addition, of the 10,602 establishments with less than 50 employees and are not in the DMMO, 80% of those that declare some separations also declare the associated costs. The equivalent fraction for hiring is much lower, 30%, but as we will see below this is fully consistent with the estimated zero hiring costs for short-term contracts (see below) which constitute the bulk of hiring in France (Abowd et al., 1999a). Now, if we focus on those firms that are found in the DMMO, we see that 75% of those that declare some separations also declare the associated costs (the figure for hiring is 40%, again consistently with the estimates that will be produced later).

As noted above, the main problem with using ESS without the information from the DMMO is that firms do not respond to all the questions regarding hiring and separation, which are crucial for assessing the extent of adjustment costs. Indeed, of the 15,606 establishments, 1969 respond to the questions about hiring (average hires: 65.66). After adding the hiring information from the DMMO, we have responses from 4255 establishments (average hires: 61.8; see Table 1a). Thus, after matching with the DMMO, we have more than twice as many valid responses but there is no evidence that the firms responding to the DMMO are substantially different from those responding to the ESS, except as regards their size, which we always use as a control variable. Only 391 firms in the ESS, responded to the question on total retirements (average retirements: 18.03, excluding zeros, S.D.: 23.84). After augmenting the data with the DMMO responses, we have 2084 responses (average retirements: 7.21, excluding zeros, S.D.: 16.95). Apparently, those firms that respond to this question in the ESS have retired more workers. The same appears to be true of firing for economic reasons. Only 300 firms in the ESS responded to the question on firing (average firing: 31.32, excluding zeros, S.D.: 63.95). After adding the DMMO data, there are 1133 firm responses (average firing: 19.80, excluding zeros, S.D.: 66.01). Finally, the cost of retirement per retiree before adding information from the DMMO is 76,931 FFr, whereas it is 134,011 FFr after adding DMMO information (see Table 1a). Equivalent figures for the costs of firing per separation are 88,153 and 95,531 FFr, respectively.

The basic message is clear. The addition of the data from the DMMO reduces the bias present in the original ESS because it permits us to mitigate the potential impact of non-response to critical variables. The original ESS was designed so that if establishments failed to respond to certain questions the information could be retrieved from other administrative data sources such as the DMMO or ESE, which are exhaustive for establishments above 50 and 20 employees, respectively. Matching these diverse sources is thus required for a valid statistical analysis. The sampling frame of the ESS is thus preserved, not compromised, by the additional data (INSEE, 1997). We use establishment size as a control variable in all analyses because this variable is clearly the primary determinant of establishments entering our analysis samples.

4. Statistical models

To incorporate the various aspects of separation or hiring costs, we consider the following statistical models. First, we write the separation cost function, $C_f(\cdot)$, as follows:

$$C_{\mathrm{f}}(f_{\mathrm{t}}) = \alpha_{\mathrm{f},0} + \alpha_{\mathrm{f},1} f_{\mathrm{t}} + \frac{\alpha_{\mathrm{f},2}}{2} f_{\mathrm{t}}^2 \tag{1}$$

if f_{t}, the number of involuntary separations (early retirements, retirements, and terminations), is positive and $C_{\mathrm{h}}(\cdot)$, the hiring cost function, as:

$$C_{\mathrm{h}}(h_{\mathrm{t}}) = \alpha_{\mathrm{h},0} + \alpha_{\mathrm{h},1} h_{\mathrm{t}} + \frac{\alpha_{\mathrm{h},2}}{2} h_{\mathrm{t}}^2 \tag{2}$$

if h_{t}, the number of new hires, is positive and where $\alpha_{j,k}$ are the coefficients of the cost function for $j=f, h$ and $k=0,\ldots,2$. Institutional costs such as severance payments imposed by the collective agreements, for example, are included in the firing costs. Help wanted advertising costs as well as training costs are included in the hiring costs. In both cost functions, we included the fixed costs, $\alpha_{i,0}$, $i=h, f$, which are modeled explicitly in our empirical results.

The firm will decide to separate or hire workers only under profit conditions that we summarize as follows:

$$f_{\mathrm{t}} > 0 \text{ if } \tilde{z}_{\mathrm{t}}\lambda + \upsilon_{\mathrm{t}} > 0$$

$$f_{\mathrm{t}} = 0 \text{ otherwise} \tag{3}$$

and to hire under the conditions:

$$h_{\mathrm{t}} > 0 \text{ if } z_{\mathrm{t}}\beta + u_{\mathrm{t}} > 0$$

$$h_{\mathrm{t}} = 0 \text{ otherwise.} \tag{4}$$

Therefore, our econometric specification amounts to generalized tobit models where separation costs are only observed in the separation regime. For separations (retirements and terminations), the tobit selection equation is based on Eq. (3) and the adjustment cost equation is Eq. (1) with observably heterogeneous coefficients in some models. Tables 2–6 analyze retirement and termination decisions in this framework. For completeness, these tables also report ordinary least squares estimates of the same specifications of Eq. (1) for those establishments with positive separations.

For hiring, the estimating equations are also a generalized tobit where hiring costs are only observed in the hiring regime. The tobit selection is based on Eq. (4) and the adjustment cost equation is Eq. (2) with observably heterogenous coefficients in some models. Tables 9–11 analyze hiring decisions in this framework.

The information collected in the ESS and DMMO corresponds to the monetary and direct part of hiring or separation costs. Production losses after separations, selection and training of new hires, and delays due to advance notice periods are not quantified in our

Table 2
The cost of retirement and early retirement in 1992

Independent variable	Mean (S.D.)	Coefficient (standard error) (1)	Coefficient (standard error) (2)	Coefficient (standard error) (3)	Coefficient (standard error) (4)
Retirement costs	956,040 (5,263,787)	dep.	dep.	dep.	dep.
Total retirements	7.72 (16.0)	215,611 (17,988)	27,435 (3468)	47,729 (15,896)	48,396 (16,375)
Total retirements (squared)	314.7 (1860.4)	− 782.7 (153.7)	− 88.0 (28.7)	− 2887.3 (987.3)	− 3045.3 (1030.1)
Intercept		− 464,798 (169,138)	579,549 (33,242)	14,406 (29,761)	80,022 (58,022)
Number of observations		1370	2554	116	374
R^2		0.179		0.075	
Log-likelihood			− 14,688.20		− 915.40

Sources: ESS 1992, ESE 1992, DMMO 1992.
Columns (1) and (3) give least squares estimates; columns (2) and (4) are estimated by maximum-likelihood (generalized tobit model). See Appendix A.2 for the coefficients of the probit selection equations. Columns (1) and (3) rely on establishments with strictly positive costs and strictly positive retirements. Columns (1) and (2) give estimates for establishments with 50 or more employees. Columns (3) and (4) give estimates for establishments with 20–49 employees.

data sources. These are typically activities of the personnel department, at least in larger firms. The direct reports of adjustment costs exclude the regular costs of the personnel department activities associated with adjustment of employment. Most firms face a clear trade-off in this area: (a) the firm can bear all of its adjustment costs at the time of hiring or separation or (b) the firm can use its personnel department to smooth out the explicit part of these costs. On the hiring side, this trade-off appears as a balance between conducting search and training activities with the personnel department (thus not reported in our data)

Table 3
The cost of retirement and early retirement by skill levels in 1992

Independent variable	Mean (S.D.)	Coefficient (standard error)
Retirement costs	1,069,506 (5,997,983)	dep.
Total retirements engineers, professionals, managers	1.45 (4.78)	527,761 (45,489)
Total retirements engineers, professionals, managers (squared)	24.9 (269.3)	− 6281.6 (651.3)
Intercept engineers, professionals, managers		− 140,814 (511,498)
Total retirements other skills	6.91 (12.81)	16,633 (21,284)
Total retirements other skills (squared)	211.8 (976.6)	48.5 (238.7)
Intercept other skills		439,008 (538,187)
Number of observations		1414
Log-likelihood		− 8080.80

Sources: ESS 1992, ESE 1992, DMMO 1992.
Maximum-likelihood estimates on all establishments (generalized tobit).

Table 4a
The cost of terminations in 1992

Independent variable	Means (S.D.)	Coefficient (standard error) (1)	Coefficient (standard error) (2)	Coefficient (standard error) (3)	Coefficient (standard error) (4)
Termination costs	1,619,246 (6,150,543)	dep.	dep.	dep.	dep.
Terminations	17.7 (57.0)	92,086 (3792)	56,299 (2771)	40,078 (9364)	51,660 (12,300)
Terminations (squared)	3565 (52,417)	− 18.4 (4.12)	− 15.6 (3.04)	− 662.7 (193.2)	− 1110.4 (351.1)
Intercept	1.89 (10.1)	100,080 (119,827)	1,138,117 (88,691)	− 25,573 (53,128)	− 31,317 (101,641)
Number of observations		1807	2392	175	343
R^2		0.517		0.101	
Log-likelihood			− 18,009.50		− 1433.10

Sources: ESS 1992, ESE 1992, DMMO 1992.
Columns (1) and (3) give least squares estimates; models (2) and (4) are estimated by maximum-likelihood (generalized tobit). See Appendix A.2 for the coefficients of the probit selection equations. Columns (1) and (3) use only establishments with strictly positive costs and strictly positive terminations for economic reasons. Columns (1) and (2) give estimates for establishments with 50 or more employees. Columns (3) and (4) give estimates for establishments with 20–49 employees.

or conducting the same activities with an external search agency (thus reported as costs of hiring). On the separation side, the trade-off is manifested through the use of the personnel department to handle some of the outplacement activities (not reported in the data) versus the use of a consulting firm to prepare the exit plan (thus reported as a separation cost). Thus, the analysis of the structure of the personnel department constitutes one way to assess and control the importance of the adjustment costs that are not measured in our data sources.

We use this argument to justify the inclusion of the variables characterizing the personnel department structure in the equations determining the hiring/separation regime. Accordingly, in the selection equations, we use the following variables: total employment; all training investments—training hours (managers, engineers and professionals), training

Table 4b
The cost of terminations in 1992 (distinguishing collective and individual terminations)

Independent variable	Coefficient (standard error)
Collective terminations	51,924 (3632)
Collective terminations (squared)	− 21.2 (3.84)
Intercept for collective terminations	1,517,208 (180,949)
Individual terminations	− 63,361 (143,493)
Individual terminations (squared)	4003 (15,700)
Intercept for individual terminations	1,668,254 (267,983)
Number of observations	2392
Log-likelihood	− 18,060.50

Sources: ESS 1992, ESE 1992, DMMO 1992.
Model estimated by maximum-likelihood (generalized tobit) on establishments with 50 or more employees.

Table 5
The cost of terminations by skill levels in 1992

Independent variable	Coefficient (standard error)
Collective terminations engineers, professionals, managers	190,549 (36,299)
Collective terminations engineers, professionals, managers (squared)	− 611.3 (179.0)
Intercept for collective terminations (engineers, professionals, managers)	765,883 (1,178,722)
Collective terminations other skills	24,646 (4042)
Collective terminations other skills (squared)	1.86 (5.11)
Intercept for collective terminations (other skills)	1,147,132 (865,668)
Individual terminations engineers, professionals, managers	− 193,014 (162,096)
Individual terminations engineers, professionals, managers (squared)	46,645 (22,380)
Intercept for individual terminations (engineers, professionals, managers)	112,967 (847,105)
Individual terminations other skills	− 24,992 (134,020)
Individual terminations other skills (squared)	− 2075 (14,120)
Intercept for individual terminations (other skills)	1,238,190 (861,563)
Number of observations	1365
Log-likelihood	− 10,282.80

Sources: ESS 1992, ESE 1992, DMMO 1992.
Model estimated by maximum-likelihood (generalized tobit) on establishments with 50 or more employees. See Appendix A.2 for the coefficients of the probit selection equations.

Table 6
The cost of terminations: decomposing the fixed costs in 1992

Independent variable	Coefficient (standard error)
Collective terminations	76,768 (5133)
Collective terminations (squared)	− 14.7 (5.89)
Intercept for collective terminations	5,065,036 (2,612,723)
Individual terminations	39,946 (224,692)
Individual terminations (squared)	− 1425.3 (24,206)
Intercept for individual terminations	4,875,678 (2,623,745)
Total employment	760,497 (248,048)
Total employment (squared)	0.2×10^{-5} (2.0×10^{-5})
Firm in expansion	− 253,337 (258,540)
Firm in contraction	304,610 (300,092)
Within-firm seniority distribution (first decile)	10,852 (47,246)
Within-firm seniority distribution (first quartile)	− 46,298 (48,711)
Within-firm seniority distribution (median)	26,428 (36,599)
Within-firm seniority distribution (third quartile)	− 4949 (36,610)
Within-firm seniority distribution (ninth decile)	43,106 (27,096)
Within-firm wage distribution (first decile)	236,910 (450,680)
Within-firm wage distribution (first quartile)	185,695 (421,063)
Within-firm wage distribution (median)	131,848 (270,502)
Within-firm wage distribution (third quartile)	− 268,735 (316,103)
Within-firm wage distribution (ninth decile)	− 851,607 (296,576)
Number of observations	2326
Log-likelihood	− 17,687.30

Sources: ESS 1992, ESE 1992, DMMO 1992.
Model estimated by maximum-likelihood (generalized tobit) on establishments with 50 or more employees.

hours (others), direct training costs, trainees' compensation (young), trainees' compensation (others); good business conditions; bad business conditions; average labor costs per employee; and the employment in the personnel department in three skill levels (clerical workers, technicians, professionals, and managers). The costs equations are, therefore, identified by the inclusion of these variables in the selection equation but not in the cost equation.

Once the number of separations, either firing or retirements, is optimally computed, the firm must decide which worker to retire or terminate. This second stage is modeled as follows. Consider workers indexed by i employed in firm $j(i)$ in 1992. These workers have observed characteristics denoted x_i and are paid w_i. First, decompose their wage rates into three parts: returns to observed characteristics, a fixed establishment effect, and a statistical residual, respectively:

$$\ln w_i = x_i\beta + \phi_{j(i)} + \varepsilon_i \tag{5}$$

where the function $j(i)$ indicates the employing establishment j for individual i.[3] Given the optimal number of separations, the selection of the workers to be fired or retired from the establishment is modeled as follows:

$$s_i = 1 \text{ if } x_i\gamma + \ln w_i\delta + \varepsilon_i\mu + \eta_i > 0$$

$$s_i = 0 \text{ otherwise} \tag{6}$$

for all i employed at $j(i)$, where ε_i is the residual of Eq. (5) and η_i is a statistical residual for the selection equation. Those workers that are either fired or retired, for which $s_i = 1$, get a severance payment or a retirement bonus b_i according to the formula:

$$b_i = \tau + (w_i \times \text{sen}_{i,j(i)})\rho + v_i \tag{7}$$

where τ is the fixed component that the firm pays to the terminated workers, ρ is the coefficient that measures the additional severance payment that is collected by terminated workers for each franc of wage and each year of seniority (as described in the legal formula, see Eq. (2)), $\text{sen}_{i,j(i)}$ is seniority in excess of the legal minimum to receive a severance payment, and v_i is a statistical residual, possibly correlated with η_i. A version of Eq. (7) in which τ is decomposed using all individual observable variables x_i is also estimated.

Identification of the various effects in Eq. (7) comes from the presence of ε_i in the selection equation and its exclusion from the bonus equation. The effect ε_i, the statistical residual in Eq. (5), measures the deviation of individual i from the wage that prevails in firm $j(i)$ given his or her individual characteristics. The presence of the establishment effect $\phi_{j(i)}$ in the wage equation controls for between-firm differences. Hence, a positive ε_i measures the deviation of the pay of individual i from the conditional mean within firm $j(i)$. The selection equation includes the estimated establishment wage effects, while the

[3] As explained in Abowd et al. (1999b), in this formulation, $\phi_{j(i)}$ is the sum of the average person and firm effect in firm $j(i)$.

bonus equation excludes them. Therefore, in the bonus equation, all effects are due to the interaction of the wage and seniority, as stipulated in the law.

5. Estimation results

Table 1a reports the summary statistics for our sample of establishments. Our first estimate of the different costs is given in this table. The 1992 retirement costs per retired worker, as reported by the establishments, were 134,011 FFr. The termination costs reported in the ESS include all severance payments paid for economic reasons and for cause (other than very serious misconduct). However, the number of workers terminated for cause reported in the ESS and the DMMO includes both workers who were terminated for serious reasons (with severance payment) and workers who were terminated for very serious misconduct (without severance payment). Hence, we give two measures of the cost for terminations.[4] The first is the ratio of the termination costs to the number of workers terminated for economic reasons; in 1992, this ratio is equal to 214,828 FFr. The second is the ratio of termination costs to the total number of terminated workers (either for economic reasons or for cause); in 1992, this ratio is equal to 95,531 FFr. The first number gives an upper bound on the termination cost whereas the second gives a lower bound since the total number of terminated workers may include terminations for ''very serious misconducts,'' which are exempted from severance payments. The hiring cost per hire was 5560 FFr. This last figure does not include the training costs. These training costs are also shown in this table. Since the ESS does not directly ask for the training costs for new hires our reported results are computed as the ratio of the training costs to total employment. This assumption probably underestimates the training costs for the new hires since the establishment total training costs were divided by total establishment employment rather than by the employees at risk to be trained. We also give estimates of the average number of workers entering, retiring from, and terminated from the establishment in 1992. Two versions of these statistics are computed. The first includes establishments with no entries, retirements, or terminations. The second does not include these establishments and, therefore, gives us the average size of the groups entering or leaving the firm in a given year. In establishments with positive entry, 64.8 workers were hired (70–80% on short-term contracts; see Abowd et al., 1999a). In establishments with positive retirements, the average size of the group of retirees is 7.2. Finally, in establishments with positive termination for economic reasons, the average size of the group of workers fired for economic reasons is 20.0, whereas in establishments with positive termination (for economic reasons or for cause) the average size is 15.0.

Table 1b provides summary statistics for our sample of fired or retired workers. The mean age of fired workers is 38 and their average seniority is 10 years. The age of retired workers is close to 59 and their average seniority is 22 years.[5] Our estimate of the mean severance

[4] However, firing for very serious misconduct is restricted and the jurisprudence is favorable to the employees.

[5] The reader is reminded that we have no specific indicator for whether a separation is a termination or a retirement. The statistics reported here reflect the definitions above.

payment is lower than our estimate of the termination cost from the previous table. The same is true for retirement bonuses. Notice, however, that both termination and retirement costs comprise more than the bonuses collected by the workers, as is apparent from the laws.

Table 2 reports our results for the determinants of the cost of retirement and early retirement. Columns (1) and (3) are estimated using least squares on observations with strictly positive retirements and strictly positive retirement costs, respectively. Columns (2) and (4) are estimated by maximum likelihood (generalized tobit) using all observations with either positive costs and positive retirements or zero costs and zero retirements. Columns (1) and (2) are estimated on all establishments with at least 50 employees, while columns (3) and (4) are estimated on establishments with 20–50 employees. As described above, this size threshold is important in France for all of these questions—in particular, the trade-off between retirement and termination should depend on the size of the establishment. The least squares and tobit estimates are quite different for the largest establishments. In the least squares estimates, the linear part is very large, the function is strongly concave, and the intercept—a measure of fixed costs—is large and negative.[6] For the tobit estimates, in which the decision to separate is also modeled, the linear part is small, the function is slightly concave, and the fixed costs, the intercept, are huge: 579,549 FFr. This difference between the two estimated equations is consistent with our model. Least squares should be downward biased; only those establishments with low costs, all other things being equal, should retire workers. All estimated coefficients for both methods, expressed in francs per retirement, are large and statistically significant.[7]

As we noted above, retirement costs are concave in the number of retired workers. The marginal cost of retiring N workers is estimated at $27{,}435 - 176N$ (in 1992 FFr) in those establishments with at least 50 employees, all other things equal. The cost of setting up the collective retirement agreement is estimated to be 579,549 FFr.

Table 3, which reports results for retirement costs with the retirees differentiated by skill levels, shows that the termination costs of retirement stem primarily from retiring engineers, professionals, and managers and not from the retirement of other workers. The cost of retiring workers with other skills seems to be convex although not precisely estimated in Table 3. Therefore, firms should optimally group retirements of their skilled workers (concave adjustment costs) and retire low-skill workers gradually (convex adjustment costs). Notice however that the low-skill component is also not precisely estimated when compared to the previous table. Indeed, the number of establishments that report the information on retirements by skills is lower than in Table 2.[8]

[6] All our models are quadratic functions of the number of retirements, separations, or hires. Even though the laws seem to imply linear costs, a number of unobserved individual characteristics of the retired or separated workers that matter to determine the retirement or separation costs will be captured by this functional form.

[7] Estimates for the probit part of the generalized tobit are shown in Appendix A.2. Most coefficients in the probit equation are significantly different from zero. Surprisingly, the variable "facing bad business conditions" has no impact on the retirement probability. Training investments—hours of training per cadre, hours of training per other type of worker, young trainees' labor costs—decrease the retirement probability, whereas the size of the establishment, total labor costs per worker, the number of clerical workers employed in the personnel department, other direct training costs, and all other trainees' labor costs increase the retirement probability.

[8] Appendix A.2 reports the coefficients for probit selection equation associated with the generalized tobit models in Table 3.

Table 4a reports the results for the costs of firing workers. Our measure of the number of terminated workers is based on the number of all terminated workers rather than just the number of terminations for economic reasons. The structure of the table is similar to that of Table 2 and the results have the same flavor.[9] Fixed costs are huge: 1,138,117 FFr. The marginal cost of terminating N workers is estimated as $56{,}299 - 31.2N$. Hence, the separation costs are roughly linear, at least much less concave than those for retirement. As before, the establishments that actually terminate their workers have lower fixed costs, which translates into larger proportional costs (see column (1)). Finally, establishments that have less than 50 employees have strongly concave costs, no fixed costs and those which indeed terminate workers do not differ from those which do not. Once again, the largest firms should optimally group the terminations.[10]

The distinction between collective and individual terminations is an important element of French employment law. One way to address this distinction, not measured in the data, is to assume that any firm that terminates 10 workers or more workers in 1992 uses the collective termination procedure while those that terminate less than 10 workers necessarily use the individual termination procedure. Results using this specification are presented in Table 4b. They are similar to the results presented in Table 4a. Most of the costs come from collective terminations. Estimates for individual terminations may appear surprising in that costs only stem from the fixed part. Identification may be difficult in this case because of a lack of variability in the number of terminations, however, firms that terminate workers, irrespective of the procedure, have much lower fixed costs than those which do not terminate workers in a given year.

Table 5 shows the impact of the skill level of the terminated workers, distinguishing once more between collective and individual procedures (defined as above since the law does distinguish by skill level). The cost of collective terminations is an increasing and concave function for engineers, professionals, and managers (cadres) and a linear function for other skills. The fixed cost part is once more difficult to estimate precisely due to the smaller number of observations. Individual terminations for engineers, professionals, and managers are also costly but the structure is convex whereas individual terminations for other workers do not appear to cost anything (but note that the estimates resemble those obtained in Table 4b, also for individual terminations). Such results once more demonstrate that firms should optimally group firings into collective procedures whenever highly skilled workers are involved.[11]

Table 6 tries to decompose the fixed cost component obtained in Table 4b using information from the survey about variables that should affect these costs. The regression includes data on wages and seniority of the workers employed in the establishment. From the data on individual workers, we have computed percentiles of the within-establishment distributions and used them as regressors. Indeed, we expect to capture elements of the costs of terminations since the law stipulates than the payments have to depend on the

[9] This is also true for the probit results, see Appendix A.2. However, the variable "facing bad business conditions" strongly increases the probability of terminations.

[10] The coefficients for the probit selection equations underlying Table 4a are presented in Appendix A.2.

[11] The coefficients for the probit selection equation associated with the generalized tobit in Table 5 are presented in Appendix A.2.

wage and the seniority of the terminated workers. Unfortunately, none of these variables have a clear impact on the costs. The size of the firm is the only element that seems to be (positively) correlated with the costs of terminating workers.

Table 7 presents estimates of Eqs. (6) (probit part) and (7) (tobit part) for the costs of firing based on individual-level data. These equations are estimated by maximum likelihood (first two sets of estimates). The probit equation is estimated using all workers employed in an establishment in which there is at least one individual observation for which the severance payment is known. The continuous part of the tobit is estimated on all workers below age 55 for whom the information on the severance payment is present. To assess the magnitude of the biases involved in selection, we also present least squares estimates of the bonus equation for the sample of terminated workers. The first set of estimates (first two columns) includes a fixed component, an indicator for collective terminations in the establishment (measured as above, since no individual information is

Table 7
Firing costs and individual characteristics

Variable	Coefficient (1)	Standard error	Coefficient (2)	Standard error	Coefficient (3)	Standard error
Probit (selection)						
Seniority	− 0.011	0.001	− 0.015	0.002		
Age − seniority	− 0.007	0.001	− 0.012	0.002		
Managers	− 0.202	0.085	− 0.274	0.086		
Technicians	− 0.345	0.080	− 0.356	0.080		
Clerks	− 0.549	0.080	− 0.576	0.081		
Blue-collar workers	− 0.494	0.077	− 0.544	0.077		
Long-term contracts (CDI)	1.352	0.091	1.363	0.090		
French	− 0.071	0.042	− 0.106	0.051		
Male	0.169	0.024	0.171	0.030		
Log wage	− 0.194	0.011	− 0.172	0.012		
Residual	0.738	0.033	0.743	0.033		
Tobit (severance payment)						
Intercept	78,755	2193.4	56,823	4768.5	13,166	916.6
Wage (in 10^6 FFr) × seniority	2400.6	327.5	381.0	584.9	3248.6	359.5
Collective termination	16,220	1622.0				
Seniority			776.3	130.3		
Age − seniority			555.4	92.3		
Manager			7513.0	2134.4		
Technician						
Clerk			1253.0	2013.0		
Blue-collar worker			4182.4	1667.0		
Male			− 498.0	1545.7		
French			3538.5	2824.9		
σ	39,022	975.7	39,912	996.4		
Correlation	− 0.898	0.007	− 0.908	0.006		
Number of observations	33,819	33,819				1705
Log-likelihood (or R^2)	− 25,733.10		− 25,779.30		0.05	

Source: ESS 1992.
Estimated by maximum-likelihood (generalized tobit) for the first two models; OLS for model (3).

available), and a variable part (annual wage times seniority). All results are consistent with those presented above: tobit estimates differ substantially from least squares estimates, in particular the fixed cost component is much larger when the estimation technique accounts for the bias associated with selection of terminated workers by the firms while the variable part is much smaller. This is consistent with the French labor laws because this part of the bonus is negotiated. When decomposed using individual characteristics (next two columns), the severance payment (expressed in 1992 FFr) is

$$\text{severance pay} = 56,823 + 776 \times \text{seniority} + 555 \times (\text{age} - \text{seniority}) + 7512 \times (\text{manager} = 1) + 4182 \times (\text{blue collar} = 1)$$

and all other coefficients are not significantly different from zero. Notice that the residuals of the two equations are (strongly) negatively correlated which confirms the bias discussed above. The selection equation also shows that clerks, blue-collar workers, high-wage workers, females, senior or aged employees, or French workers are less likely to be

Table 8
Retirement costs and individual characteristics

Variable	Coefficient (1)	Standard error	Coefficient (2)	Standard error	Coefficient (3)	Standard error
Probit (selection)						
Seniority	0.076	0.012	0.080	0.012		
Age–seniority	0.061	0.011	0.065	0.010		
Managers	0.056	0.189	− 0.147	0.195		
Technicians	− 0.054	0.181	− 0.144	0.187		
Clerks	− 0.155	0.188	− 0.232	0.194		
Blue-collar workers	− 0.273	0.176	− 0.341	0.182		
French	− 0.113	0.113	− 0.085	0.120		
Male	0.183	0.077	0.151	0.082		
Log wage	− 0.406	0.054	− 0.419	0.053		
Residual	1.632	0.093	1.623	0.107		
Tobit (retirement bonus)						
Intercept	77,554	9167	294,023	17,192	12,011	4298
Wage (in 10^6 FFr) × seniority	5446	753	1081	1811	7121	720
Seniority			− 2718	684		
Age–seniority			− 3181	490		
Manager			45,932	17,998		
Technician						
Clerk			− 11,203	19,824		
Blue-collar worker			− 17,682	19,275		
Male			11,117	7702		
French			− 8087	11,876		
σ	68,738	3396	73,908	4068		
Correlation	− 0.644	0.055	− 0.793	0.057		
Number of observations	2636		2636		404	
Log-likelihood (or R^2)	− 5968.80		− 5958.60		0.20	

Source: ESS 1992.
Estimated by maximum-likelihood (generalized tobit) for columns (1) and (2); OLS for column (3).

Table 9
The cost of hiring in 1992

Variable	Mean (S.D.)	Coefficient (standard error) (1)	Coefficient (standard error) (2)
Hiring costs	218,475 (2,065,041)	dep.	dep.
Total hiring	84.7 (159.9)	2909 (700.5)	2015 (780.9)
Total hiring (squared)	32,725 (182,935)	− 1.94 (0.61)	− 1.42 (0.65)
Intercept	2.10 (9.88)	35,653 (67,193)	385,364 (137,351)
Number of observations		1562	1679
R^2		0.012	
Log-likelihood			− 13,464.80

Sources: ESS 1992, ESE 1992, DMMO 1992.
Model (1) uses least squares estimates on the establishments with strictly positive costs and strictly positive hires. Model (2) is based on maximum-likelihood estimates (generalized tobit).

selected while overpaid workers (as measured by ε_i, the residual of the wage Eq. (5), i.e. workers that are better compensated than workers employed in the same establishment with identical individual characteristics) are more likely to get terminated.

Table 8 presents estimates of the same set of equations for retirement payments. All equations are estimated on workers who are at least age 55 (the first age to benefit from preretirement or retirement programs, see Eq. (2)).[12] All equations have the same structure as described for Table 7. Selection biases are large and the fixed component is a major part of the retirement bonus. Decomposed in terms of individual observable variables, the cost is

$$\text{retirement bonus} = 294,022 - 2718 \times \text{seniority} - 3181 \times (\text{age} - \text{seniority}) + 45,932 \times (\text{manager} = 1)$$

Notice that, for all workers, seniority and age coefficients are large; otherwise, the workers would not benefit from these retirement programs. As for termination costs, the correlation between the selection and the bonus equations is large and negative. However, age and seniority as well as ε_i enter positively in the selection equation.[13]

Table 9 presents estimates of the cost of hiring new workers. The table reports least squares results (column 1) as well as generalized tobit estimates (column 2). As above, the two methods give very different estimates of the fixed cost component while the quadratic part is similar in both columns. Notice, however, that the number of establishments with no hires in 1992 is quite small: 117, the difference between the number of observations in column (2) and in column (1). This may explain the high fixed cost of hiring for those 117 establishments.

[12] We also estimated the same tobit equation with a selection equation run on all potential workers with no changes in the estimated coefficients, albeit more precision in the estimates of the probit equation.

[13] We also estimated the models in Tables 7 and 8 including the decomposition of the wage rate into residual and firm effects. The results are not substantively changed. The coefficient on the firm effect is negative. High paying firms tend to separate workers less often. The positive coefficient on the residual is slightly reduced in magnitude.

Table 10
The cost of hiring by skill levels in 1992

Variable	Mean (S.D.)	Coefficient (standard error)
Hiring costs	227,171 (2,434,239)	dep.
Total hiring engineers, professionals, managers	8.34 (23.06)	68,174 (10,033)
Total hiring engineers, professionals, managers (squared)	601.0 (6341)	− 188.4 (37.7)
Intercept engineers, professionals, managers	2.17 (10.89)	− 100,043 (342,521)
Total hiring other skills	73.76 (156.6)	− 1769 (1485)
Total hiring other skills (squared)	29,944 (184,662)	− 0.55 (1.13)
Intercept other skills	123.2 (1856)	− 33,044 (361,702)
Number of observations		939
Log-likelihood		− 13,710.10

Sources: ESS 1992, ESE 1992, DMMO 1992.
Maximum-likelihood estimates (generalized tobit).

Table 10 reports the structure of hiring costs when we differentiate the hires by skill level. The hiring costs are due primarily to entry of engineers, professionals, and managers. Table 11 shows, on a small sub-sample, that the type of contract matters. Hiring costs are due entirely to entry of highly skilled workers on long-term contracts (CDI). Once again, the cost function is increasing and concave; thus, firms should group their hiring of engineers, professionals, or managers.

As a final measure of the reasonableness of our results, we computed a simulation of the effect of adjustment costs on total labor costs using results from our estimated models. The results of this exercise are shown in Table 12. We model an average-size establish-

Table 11
The cost of hiring by skill level and contract type in 1992

Variable	Mean (S.D.)	Coefficient (standard error)
Hiring costs	1,438,353 (8,653,507)	dep.
Total hiring, CDI, engineers, professionals, managers	15.44 (21.42)	270,051 (94,536)
Total hiring, CDI, engineers, professionals, managers (squared)	691.6 (2677)	− 1251 (743)
Total hiring, CDD, engineers, professionals, managers	6.29 (27.56)	82,833 (184,684)
Total hiring, CDD, engineers, professionals, managers (squared)	790.0 (6784)	− 344.6 (748.0)
Total hiring, CDI, other skills	29.64 (60.84)	75,669 (56,890)
Total hiring, CDI, other skills (squared)	4536 (23,649)	− 168.9 (136.3)
Total hiring, CDD, other skills	127.8 (238.1)	− 16,054 (12,788)
Total hiring, CDD, other skills (squared)	72,378 (230,965)	− 9.21 (12.35)
Intercept	5.06 (12.16)	− 2,224,813 (1,581,474)
Number of observations		86
R^2		0.187

Sources: ESS 1992, ESE 1992, DMMO 1992.
Least squares estimates. The models use only those establishments with strictly positive costs, with strictly positive hires, and reported data on hires by types of contract and skill levels.

Table 12
Estimated annualized effect of adjustment costs on per worker total labor cost

	Estimated number of workers	Expected completed job duration	Average annual wage	Annualized adjustment cost	Adjustment cost/total compensation (%)
Workers less than age 50					
Managers, engineers, and professionals	11.0	6.50	362,115	16,629	4.4
Middle-level managers and professionals	29.6	6.92	204,489	17,699	8.0
Clerks	45.3	5.33	144,149	13,651	8.7
Unskilled white-collar workers	9.4	3.08	123,429	7878	6.0
Skilled blue-collar workers	48.9	6.07	144,514	15,531	9.7
Unskilled blue-collar workers	34.1	4.68	121,898	11,971	8.9
Workers age 50 and over					
Managers, engineers, and professionals	2.0	8.84	465,645	13,181	2.8
Middle-level managers and professionals	3.4	10.01	246,270	14,923	5.7
Clerks	3.6	9.09	166,095	13,554	7.5
Unskilled white-collar workers	0.8	7.24	124,748	10,796	8.0
Skilled blue-collar workers	5.0	9.76	156,652	14,546	8.5
Unskilled blue-collar workers	2.7	8.88	131,461	13,229	9.1

Source: DADS 1976–1996.

ment (196 employees; see Table 1a). The table shows the distribution of the relevant data for younger (age below 50) and older (age 50 and over) workers for six different occupation groups. The distribution of employment, completed job duration, and wages by age and occupation is based on 21 years of data from the Déclarations Annuelles de Données Sociales (DADS).[14] The column entitled "Expected Completed Job Duration" is an estimate of the length of a completed employment spell for a worker in the indicated age and occupation group that is based on a Weibull hazard model controlling for age, sex, and occupation. The column entitled "Average Annual Wage" is the full-time, full-year labor costs per employee, including all compensation, payroll taxes (in 1992 FFr). The column entitled "Annualized Adjustment Cost" is the annualized adjustment cost of replacing the worker. For younger workers the adjustment costs are based on two assumptions: (1) involuntary terminations are 10% of all terminations (see Appendix A.1 for stable establishments) and (2) the termination costs are summarized in Table 4a column (2). For older workers the adjustment costs are based on three assumptions: (1) all separations of older workers are employer-initiated retirements; (2) the optimal grouping of retirements is every 3 calendar years[15]; and (3) the retirement costs are given in Table 2

[14] See the appendix to Abowd et al. (1999b) for a full description of these data. We based our occupation-specific estimates on these data because they are much more comprehensive (1/25 sample of the French labor force) than the ESS data used in the basic estimation.

[15] The expected number of retirements per year is slightly above two in the simulation. The average number of retirements, excluding zeros, in our sample is 7.2 (see Table 1a). This implies that the retirements have been lumped into batches processed approximately every 3 years.

column (2).[16] The column showing the ratio of adjustment cost to total cost (inclusive of adjustment costs) is a measure of the percentage increase in marginal productivity that a worker in that row must deliver in order for the employer to recover the investment associated with separation costs.[17] The results show that adjustment costs require younger managers, engineers and professionals to be 4.4% more productive than in a frictionless world. Older managers must only be 2.8% more productive. These are the two groups for which separation costs have the smallest effect on the total costs of employment. The group where separation costs are most important is all ages of blue-collar workers, both skilled and unskilled. For these workers, the investment represented by separation costs increase total annual labor costs by 9%.

6. Conclusions

In this article, we present estimates of the structure of retirement, termination, and hiring costs using, for the first time, representative establishment-level data matched with individual-level information. These costs are directly reported by the sampled establishments. We provide estimates of the magnitude of these costs as well as statistical summaries of their functional shape given the number of movements or the characteristics of the workers. It appears that both retirement and termination costs are increasing and mildly concave in the number of retired or terminated workers. Furthermore, the fixed costs are very large, giving the firm an incentive to group exits instead of adjusting gradually. Termination costs are largest for collective terminations as opposed to individual ones. These costs are largest for highly skilled employees. Hiring costs also exhibit the same structure; concave adjustment costs with a strong fixed component. But these hiring costs do not have the same structure for all skill levels. Only hires of cadres on long-term contracts (CDI) have an increasing and concave impact on the cost. For all other skill levels and types of contract, hiring costs do not depend upon the number of entries. Thus, for hiring costs, the firms have an incentive to group the managerial (cadre) hiring but no adjustment costs for other hiring. The costs of hiring are much less important in France than the costs of separations (retirements and terminations). The structure of the personnel department is also related to all types of entries and exits. We remind the reader that our estimates are based on a single cross-section of establishments and, thus, may be due to compositional effects rather than any single firm's cost structure.

Our results show, for the first time, direct evidence on the shape and structure of firm-level adjustment costs in contrast to the vast amount of indirect evidence based upon estimating dynamic labor demand equations (Hamermesh, 1995). In France, at least, adjustment costs display two sources of lumpiness—the fixed component of the termination or retirement costs (also present in the individual-based estimates) and the concave

[16] We used the overall estimates for younger and older workers rather than the occupation-specific results because the latter were not as precisely estimated due to the larger number of establishments that did not report occupational detail.

[17] We excluded the hiring costs from this analysis because they are dwarfed by the separation costs.

shape of these costs, which may explain why firms tend to prefer large adjustments over smaller ones, a feature also found in Caballero et al. (1997).

On one hand, wages appear to be rigid in France (see Card et al., 1996). On the other hand, Abowd et al. (1999a) have shown the existence of a considerable amount of worker turnover in France. Indeed, most of these movements stem from the entry and exit of workers on short-term contracts (CDD). Since the termination or retirement of workers on indefinite duration contracts (CDI) causes adjustment costs in our estimates while the termination of CDD workers does not, the conjunction of rigid wages, high firing costs for workers on CDI, and easy hiring and separation for workers on CDD seems to explain the observed behavior of French firms. In particular, our estimates explain why these firms hire primarily on short-term contracts, why they reduce entries in bad times without increasing separations, and why young workers find it difficult to get a job from unemployment.

All of the microeconomic evidence for France has counterparts in the US that are not very different from those observed in France. The turnover levels are quite similar for the two countries.[18] The levels of severance payments incurred by the firms tend to be lower in the US, in particular for low-wage workers, but the difference is less strong than originally supposed: roughly 40% of full-time workers employed at medium or large employers are covered by severance payments while only 20% of those employed at employers with fewer than 100 employees (see BLS, 1993, 1994, 1995). Survey evidence provides even higher severance pay incidence, respectively, 90% and 66% (see Lee et al. in BNA, 1996). The same private survey reports an average maximum severance of 39 weeks for executives, 32 weeks for exempts, and 30 weeks for non-exempts. In addition, the experience rating in the UI system increases the costs of separations in the U.S. relative to France where there is no such experience rating system.

Like minimum wages, hiring and separation costs induce labor market rigidities. However, the link between these labor market rigidities and the high French unemployment rate is difficult to assess. In particular, as Blanchard and Katz (1997) show, increased flows into and out of unemployment do not necessarily imply a higher unemployment rate. Hence, just because there is a strong incentive to reduce adjustment costs and to increase the flows into and out of employment by the use of CDD employment contracts in France, the equilibrium rate of unemployment is not necessarily higher. Our evidence addresses the way in which adjustment costs interact with economic shocks to affect employment flows but we do not have any direct evidence on the steady state employment consequences of the French labor laws.

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[18] See Anderson and Meyer (1994) for the US and Abowd et al. (1999a) for France.

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Appendix A

Appendix A.1, which is based on the data analysis from Abowd et al. (1999a), shows the rates of entry and exit of worker of different contract types. The table distinguishes between CDD and CDI workers. The three lines of the table show the rates per 100 employees of growing, shrinking and stable establishments. Appendix A.2 presents the selection equations associated with the models presented in Tables 2–5 of the text.

A.1. Table A1: Rates of entry/exit of workers by employment growth category and type of employment contract or separation (per 100 employees)

Employment growth category	Hired into long-term contract	Hired into short-term contract	Total entry	Quits	End of short-term contract	Retirement	Terminations	Total exits
Establishments with increasing employment in year *t* (all years) (*N* = 3465)	9.8 (83.4)	26.9 (187.6)	37.2 (201.4)	9.6 (62.2)	17.9 (158.3)	0.6 (6.9)	1.9 (21.4)	30.3 (187.6)
Establishments with decreasing employment in year *t* (all years) (*N* = 3179)	5.1 (48.1)	17.4 (160.5)	22.7 (170.9)	8.8 (53.8)	16.2 (154.0)	1.2 (12.7)	2.7 (31.0)	29.8 (178.5)
Establishments with stable employment in year *t* (all years) (*N* = 371)	7.1 (61.9)	15.5 (128.6)	22.7 (138.6)	8.5 (65.1)	12.1 (114.1)	0.8 (9.6)	1.6 (13.6)	23.1 (140.9)

Sources: Abowd et al. (1999a) based on Table 8. Original source: DMMO, 1987–1990, weighted by ex post weights.

A.2. Table A2: Selection probits to accompany retirement and termination equations (Tables 2–5)

	Table 2, column (2)		Table 2, column (4)		Table 3	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Retirement equations						
Trainees' compensation (young)	−0.0404	0.0166	0.0787	0.0553	−0.0603	0.0323
Trainees' compensation (others)	0.0423	0.0109	0.0834	0.0316	−0.0098	0.0255

Table A2 (*continued*)

	Table 2, column (2)		Table 2, column (4)		Table 3	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Retirement equations						
Training costs per worker	0.0160	0.0080	0.0565	0.0321	− 0.0065	0.0294
Human resources department (professionals)	− 0.0012	0.0029	− 0.0917	0.2029	0.0679	0.0486
Human resource department (technicians)	0.0012	0.0033	0.1129	0.1719	0.0209	0.0287
Human resource department (clerks)	0.0121	0.0026	0.0131	0.1369	0.0146	0.0289
Total employment	0.4330	0.0424	8.7644	6.7001	0.0003	0.0002
Training spending (professionals)	− 0.5410	0.2441	− 0.1206	1.2220	− 0.5441	0.3501
Training spending (others)	− 0.9582	0.7109	− 0.3911	1.0259	0.0689	1.6686
Average labor costs (per worker)	0.0024	0.0004	− 0.0001	0.0005	0.0100	0.0013
Good business conditions	0.0031	0.0449	− 0.0538	0.1522	0.0063	0.0851
share of professionals, technicians					− 2.2016	0.6951
Share of clerks					0.5094	0.4578
Share of blue-collar workers					0.4444	0.4107
Constant	− 0.5195	0.0662	− 1.0743	0.3099	− 1.4563	0.4515
	Table 4a, column (2)		Table 4a, column (4)		Table 5	
Termination equations						
Trainees' compensation (young)	− 0.0163	0.0198	− 0.0155	0.0542	− 0.0430	0.0243
Trainees' compensation (others)	− 0.0112	0.0121	0.0235	0.0365	0.0248	0.0236
Training costs per worker	− 0.0212	0.0100	− 0.0856	0.0305	0.0224	0.0171
Human resources department (professionals)	0.0640	0.0199	0.0681	0.2093	0.2733	0.0864
Human resource department (technicians)	− 0.0160	0.0062	0.0123	0.1128	0.1045	0.0225
Human resource department (clerks)	− 0.0097	0.0053	− 0.0811	0.1372	− 0.0744	0.0090
Total employment	1.1919	0.1210	− 3.6085	6.7408	2.8376	0.2887
Training spending professionals)	0.6647	0.4541	− 2.3556	1.4194	2.7709	0.1670
Training spending (others)	− 1.2733	0.6948	− 1.9869	1.6502	− 9.6009	0.0630
Average labor costs (per worker)	0.0009	0.0006	0.0012	0.0006	0.0020	0.0011
Good business conditions	0.5745	0.0617	0.6096	0.1559	0.5528	0.0859
Share of professionals, technicians					2.6412	0.7094
Share of clerks					− 0.2820	0.3240
Share of blue-collar workers					0.0882	0.2853
Constant	0.0767	0.0904	− 0.0733	0.3120	− 0.5867	0.3171

Sources: ESS 1992, ESE 1992, DMMO 1992. See Tables 2–5 in text.

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