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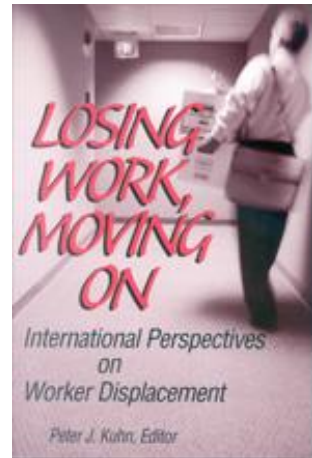
## Worker Displacement in France and Germany

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# 5

## Worker Displacement in France and Germany

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### INTRODUCTION

In this chapter, we describe the evolution of earnings and employment, postdisplacement and post-other-separation, for workers in France and Germany. Although the literature on displaced workers (those who experienced involuntary separations from stable jobs for reasons beyond their control) in North America is already extensive, the European literature is limited. We consider two labor markets in which layoffs are heavily regulated (as opposed to the relatively flexible Canadian and United States labor markets). We exploit administrative data from both countries that match workers to their employers and have the advantages (relative to survey-based analyses) of providing large, representative samples of a wide range of workers from all sectors, thereby allowing for the straightforward construction of control groups. Administrative data have the additional advantage that

reported earnings and employment durations are precisely measured and not subject to recall bias.

One particularity of our approach is that we focus our attention on workers whose separation is a result of the closure of the employing firm (in the case of France) or plant (in the case of Germany). This is for two main reasons. First, our administrative data do not allow us to distinguish the reason for separation when the separation is not related to the employer's shutting down. Second, our measure avoids the frequently cited problem of relying on workers to accurately report the reason for separation. This is particularly important in heavily regulated labor markets like those of France and Germany, since the administrative procedures that must be followed in the case of layoffs are typically much longer and more complicated than the procedures surrounding quits. For this reason, declared quits in these countries may frequently be layoffs disguised so as to avoid the administrative complications. Furthermore, workers often misreport firing for cause as a layoff—and these two events can have very different implications for the non-employment durations and earnings losses involved.

A second issue is that we consider non-employment, as opposed to unemployment, durations following displacement. We do so partly because our data for France do not allow us to discern whether the worker is actively looking for employment when not employed (as the ILO definition of unemployment requires). In Germany we observe only unemployment benefit and unemployment assistance durations, although individuals may experience spells of unemployment while being ineligible for benefits. We also limit ourselves to non-employment because the complexity of the unemployment insurance schemes (see the section on institutions below) brings the explicit modeling of their role beyond the scope of this chapter.<sup>1</sup>

In addition to describing the institutional context in France and Germany, our analysis focuses on non-employment durations and earnings changes experienced by workers who have stayed with a single firm for at least four years as the principal measures of interest. More precisely, we look at prime-age males in the age range of 26–55 (for France) and 25–56 (for Germany). We distinguish between workers who separate from their firm (in the case of France) or plant (in the case of Germany) as a result of a closure (referred to as displaced workers) and those who separate for unknown reasons. This last cate-

gory includes workers who are fired for cause, workers who leave the firm or plant because they receive a better offer, and workers who drop out of the labor force.<sup>2</sup> The literature has concentrated primarily on these measures,<sup>3</sup> finding that displaced workers tend to experience earnings losses both pre- and postdisplacement and that workers displaced as a result of a firm or plant closure tend to have shorter non-employment durations than workers who separate from from their employers involuntarily for other reasons (Gibbons and Katz 1991).

The structure of our chapter is as follows. We begin by describing the institutional setting surrounding layoffs and unemployment benefits in France and Germany. This discussion provides the context in which the subsequent results need to be considered. Then, after describing the data sources we use, we describe the incidence of displacement in the two countries. We then proceed with a more detailed analysis of the non-employment durations following displacement, followed by a description of the earnings changes associated with displacement. The next section provides results of a regression analysis of earning changes before, around, and after displacement, and the final section summarizes our results and concludes.

## **INSTITUTIONS**

Both France and Germany have detailed regulations concerning layoffs and unemployment compensation. For each country, we describe the institutions surrounding layoffs, followed by a brief description of the unemployment benefit system and the main prevailing-wage-setting mechanisms.

### **France**

Following is a brief summary of the labor law and jurisprudence surrounding worker displacement, or layoffs for economic reasons.<sup>4</sup> An excellent reference for this (in French) is Lefebvre (1996).

### **Laws concerning layoffs for economic reasons (displacements)**

The legislation and jurisprudence surrounding displacements distinguishes four classes of layoffs: individual, fewer than 10 employees over 30 days, more than 10 employees over 30 days, and bankruptcy or reorganization.<sup>5</sup> One common characteristic of all displacements is that the employer is required to offer the option of participating in a partially employer-funded retraining scheme to all employees who will be laid off. This retraining program is run by the fund that finances unemployment benefits (ASSEDIC) and made available.

- Individual displacements have to meet the obligations surrounding both individual layoffs for personal reasons and layoffs of fewer than 10 employees over 30 days (with the exception of the obligation to inform the works council; see below). The obligations attached to the layoffs for personal reasons include an invitation to a “reconciliation” meeting at which the layoff will be discussed, an actual holding of the reconciliation meeting (to which the worker can bring an outside representative), and a notification-of-layoff letter, all with required delays and notice periods. The displaced employee must also be guaranteed priority in future hiring for all jobs for which he or she is qualified, and this obligation runs for one year following the layoff.
- The case of displacements involving fewer than 10 employees in a 30-day period is more complicated than that of individual displacements. First, the works council (or personnel representatives in firms too small to have a works council, that is, with fewer than 50 employees) must be consulted. The employer must provide all useful information to the works council concerning the economic circumstances that motivate the layoffs, the number of employees to be laid off by occupational category, the criteria used to determine the order of layoffs (in other words, which employees will go), and a preliminary calendar for the layoffs. Each employee must still be invited to a “reconciliation” meeting, and the layoff letters can be sent out only after the appropriate waiting period following this meeting.
- In the case of displacements involving more than 10 people in a 30-day period, things become even more complicated. The enter-

prise must devise a “social plan” which, in addition to proposing ASSEDIC retraining programs, must describe the possibilities for an internal reclassification within the enterprise (when the enterprise is larger than 50 employees) and the steps the enterprise is prepared to take in terms of helping laid-off employees become self-employed, providing training in new fields, or reducing the workweek. Along with all of the information described in the previous case, this plan has to be given to the works council, when one exists, or to the personnel delegates for consultation. The works council can request the help of an “expert accountant” to evaluate the different aspects of the employer’s social plan and explanations for the layoffs. The local labor ministry office also receives a copy of the social plan, and both the works council and the labor ministry can make suggestions to which the employer must respond. There must be two meetings held with the works council, or three if the works council brings in an accountant. There are specified delays between the meetings which vary with the size of the proposed layoff, but there is no obligation to meet individually with each employee in this case. The selection of the individuals to be laid off will typically be determined by a governing collective agreement, but in the absence of such an agreement it is the employer who fixes the criteria after consultation with the works council. The layoff letters can be sent out only after a fixed delay following the final meeting with the works council.

- The conditions surrounding layoffs in the case of bankruptcy or court-ordered reorganization are similar to those for the previous case, except that it is the court-appointed administrator who makes the proposals, and the judge responsible for overseeing the liquidation or reorganization must approve all layoffs.

### **Advance notice and severance pay**

The forewarning that workers receive before being laid off varies according to the size of the layoff, whether or not an expert accountant is called in, the size of the firm, and whether the employer and employee agree upon a buyout of the notice period. The time taken by just following the legal procedure (prior to the official advance notice

that starts running from the moment the layoff letter is received) can vary from 1) 35 days between the mailing of the invitation to the “reconciliation” meeting to 2) the sending out of the layoff letter (in the case of an individual displacement), to 3) 74 days or more from the date at which the first works council meeting is held (in the case of a layoff of 10 or more people in 30 days, with expert accountant called in, not counting the time it takes to devise the social plan or respond to suggestions made by the works council and the labor ministry). After the layoff letters are sent out, the official advance-notice period begins. This period is a function of seniority: a minimum of one month for employees with six months to two years of seniority, and two months for employees with at least two years of seniority. If a collective agreement exists that provides for longer notice periods, the longer periods prevail.

Severance pay is a function of seniority, whether or not the employee had accrued unused paid vacation time, and whether the employer buys off the official notice period. In general, the base rate of severance pay is 1/10th monthly earnings per year of seniority (if seniority is greater than two years), with an additional 1/15th monthly earnings per year of seniority if seniority is greater than 10 years. The worker also recovers the value of unused paid vacation time, plus one to two months of earnings in the case where the notice time is bought off, corresponding to the level of seniority.

### **Unemployment benefit eligibility and levels**

To be eligible for unemployment benefits, workers must meet the following conditions.<sup>6</sup> First, they must have been employed for a sufficiently long period preceding the start of the episode of unemployment. There are five criteria defining the minimum number of days or hours worked over a reference period.<sup>7</sup>

Second, they must be enrolled on the National Job Search Agency (ANPE) lists. Third, they cannot have voluntarily quit their previous job although layoffs, even for cause, are acceptable.<sup>8</sup> Fourth, they must be actively looking for a job or, if over 57-1/2 years old, must reside in France. Fifth, they must be younger than 60 or between 60 and 65 and ineligible for retirement with full benefits. Sixth, they must be physically able to hold down a job. Finally, they cannot be “seasonally unemployed”; that is, they can not have come from a job that is classi-

fied as seasonal, nor can they have had a job that, for two of the prior three years, had regular periods of inactivity at more or less the same calendar dates each year.

Unemployment benefits are taxable as revenue and are made up of a base rate that applies for a first period, then a “digressivity coefficient” which lowers the benefits for a second period. The daily base rate is comprised of a fixed component (56.95 francs in June 1996) and a variable component corresponding to 40.4 percent of reference earnings. The total can neither exceed 75 percent of the reference level of earnings nor be less than a statutory minimum level (138.84 francs in June 1996). There are also provisions relating to high-earnings workers that guarantee them at least 57.4 percent of their reference earnings.

The digressivity coefficient and the durations of the benefit periods are functions both of the age of the worker and his or her “length of affiliation” (cumulative seniority in any covered employers during a reference period). Durations range from 1) 122 days (four months) for workers with only 122 days or 676 hours of eligibility over the previous eight months (all at the second-period rate with a digressivity coefficient of 0.75) to 2) an 821-day (27-month) first period and a 1,004-day (33-month) second period, with digressivity coefficient of 0.92, for workers over 55 years old with 821 days or 4,563 hours of eligibility over the preceding 36 months. Thus, if a 56-year-old person worked 27 out of the 36 months preceding a spell of unemployment, he or she would have a right to five years of benefits, with the lowest rate still being 92 percent of his or her previous benefit level.<sup>9</sup>

### **Wage-setting institutions**

During the period of time covered by our French data (1984–1989), the French industrial relations environment was undergoing significant changes. Although union membership was steadily declining, union coverage remained relatively stable. This phenomenon was due largely to the policy of contract extension. This policy allows the Ministry of Labor to take a collective agreement negotiated by an employers’ association and several union confederations and extend its coverage to all other enterprises in the same region or sector, or all individuals in the same occupation, as those covered by the contract, regardless of their participation or membership in the employers’ association or union confederation that actually negotiated the contract.<sup>10</sup>



Despite the high level of contract coverage, important modifications of the structure of collective bargaining were brought about by the Auroux laws of 1982. Two of the most important features were 1) the establishment of works councils and the definition of their consultative role in mass layoffs (see above) and 2) the requirement to engage in bargaining at the enterprise level for all firms over a minimum size. Although there was no obligation to come to an agreement, the fact that employers were required to negotiate locally encouraged a gradual shift of collective bargaining over wages from a centralized to a more decentralized level. This shift reduced the frequency with which the national, often extended, agreements had their salary grids renegotiated. Given the constant increase in the real minimum wage over the period (see below), the share of contracts for which the lowest earners on the salary grid earned more than the minimum wage fell from 15.3 percent in January of 1983 to 3.6 percent in January of 1985.<sup>11</sup>

The first minimum-wage law in France was enacted in 1950, creating a guaranteed hourly wage rate that was partially indexed to the rate of increase in consumer prices. Beginning in 1970, the original minimum-wage law was replaced by the current system (called the SMIC, for *salaires minimum interprofessionnel de croissance*), linking the changes in the minimum wage to both consumer price inflation and growth in the hourly blue-collar wage rate. In addition to annual formula-based increases in the SMIC, the government legislated increases many times over the next two decades. The statutory minimum wage in France regulates the hourly regular cash compensation received by an employee, including the employee's part of any payroll taxes.

Although the original minimum wage program (called the SMIG, for *salaires minimum interprofessionnel garanti*) was only partially indexed—in particular, the inflation rate had to exceed 5 percent per year (2 percent from 1957 to 1970) to trigger the indexation—the real minimum wage did not decline measurably over the entire post-war period and increased substantially during most decades.<sup>12</sup> The French minimum wage lies near most of the mass of the wage-rate distribution for the employed workforce. In 1990, the first mode of the wage distribution was within 5 francs of the minimum wage and the second mode was within 10 francs of the minimum. In the overall distribution, 13.6 percent of the wage earners were at or below the minimum wage and

an additional 14.4 percent were within an additional 5F per hour of the SMIC.<sup>13</sup>

## Germany

### Employment security and dismissal protection

German dismissal protection is based on an extensive system of legal rules and collective contracts. Historically, dismissal protection is rooted in a framework of directives developed during the Weimar Republic. It was developed in the 1950s to 1970s, and went through a process of amendments during the 1970s and 1980s (see Büchtemann 1990).

One can distinguish between general dismissal protection and specific dismissal protection, with the latter applying to individuals in specific situations. The general dismissal protection was first regulated in the *Bürgerliches Gesetzbuch* (BGB) and in the *Kündigungsschutzgesetz* (KSchG). Since those were enacted, however, it has undergone a number of slight revisions.<sup>14</sup> The most notable is the Employment Promotion Act (*Beschäftigungsforderungsgesetz*), or EPA of 1985, which is discussed below in more detail.

The KSchG applies to all blue- and white-collar workers with more than six months of uninterrupted tenure in firms with more than six regularly employed workers. According to Büchtemann (1990), it covers about 80 percent of all blue- and white-collar workers.

The general dismissal protection regulations as laid out in the KSchG are supplemented by regulations which apply to individuals in specific circumstances. For instance, specific regulations apply to handicapped people, people on maternity leave, and people who are serving in compulsory military or civil service. In 1987–1988, 16 percent of all dismissals fell under these complementary rules (see Büchtemann 1990).

According to the KSchG, all dismissals of employees who are employed for more than six months without interruption, which are initiated by the employer, are invalid if they are socially unacceptable. Accordingly, dismissals of all individuals to whom the KSchG applies have to be justified by the employer. Acceptable reasons for dismissal may be due to the firm's concerns or macroeconomic shocks (or the employee's absenteeism or illness, for example). In the case of dis-

missals caused by economic difficulties on the side of the firm, the KSchG stipulates that social criteria (such as seniority) should be used to determine which employees are to be dismissed. Employees who feel that they have been unjustly dismissed have the right to sue the employer in the labor courts. In 1987, about 10 percent of dismissals were brought to court by dismissed employees, although in very few cases did this lead to a continuation of the employment relation (see Büchtemann 1990). In addition, German dismissal protection has a strong collective component. For every dismissal, the works council has to be consulted.

Concerns about the negative effects of the rather rigid dismissal-protection regulations on firms' employment policies led to the Employment Promotion Act of 1985. The EPA introduced some deregulating measures which do not replace, but rather complement, existing employment-protection regulations. They mainly promote fixed-term contracts as an instrument for enhancing flexibility. More specifically, the EPA allows fixed term contracts to be established without a particular reason (which was not the case before). Contracts are limited to a duration of 18 months, and they are not renewable. The EPA originally limited them to five years, but this was extended twice. At present its applicability lasts until the year 2000 (see Rogowski and Schömann 1996).

### **Advance notice and severance pay**

The advance-notice period in Germany varies according to the size of the layoff, the seniority of the worker, and whether he or she is a blue- or white-collar worker.<sup>15</sup> Furthermore, there are a number of collectively bargained regulations as well as firm-worker specific agreements that include notice provisions. The legal advance-notice regulations stipulate four weeks of notice for blue-collar workers who have been employed for at least five years, and 12 weeks for white-collar workers. After 20 years of employment with the same firm, these periods rise to 12 weeks and 24 weeks for blue- and white-collar workers, respectively (see Buttler, Brandes, Dorndorf, Gaum, and Walwei 1992).

If a firm dismisses a considerable fraction of its workforce, the layoffs have to be reported to the local employment office and to the works council. For instance, a firm which employs between 21 and 59

workers has to report if the number of dismissals exceeds six workers within a period of 30 working days; a firm which employs between 60 and 499 employees has to report layoffs of more than 25 workers, or when layoffs exceed 10 percent of the firm's workforce; a firm which employs more than 499 workers has to report if layoffs exceed 30 workers.

If the reduction in the firm's workforce exceeds certain numbers, the works council can demand a social plan. For instance, when dismissals exceed 20 percent of the workforce (or at least six workers for a firm of size 21–59 or more than 36 workers for a firm of size 60 to 249), a social plan can be demanded. Social plans describe the conditions surrounding severance pay and other payments.

### **Unemployment benefit eligibility and levels**

The German unemployment compensation scheme distinguishes between unemployment insurance benefit (*Arbeitslosengeld* (AG)) and unemployment assistance (*Arbeitslosenhilfe* (AH)). To be eligible for AG, the employee must have contributed to the system for at least 12 months over the preceding three years. The system is financed by employer and employee contributions in equal parts (each part amounting to 3.25 percent of the employee's salary). There is a waiting period of 12 weeks if the separation was induced by the employee, but receipt of AG starts immediately if the separation was caused by the employer. The compensation is based on previous *net* earnings, and it amounts to 67 percent of the previous net wage (60 percent for employees without children). There is an upper threshold (5,200 DM in 1984 and 6,000 DM in 1990, for instance). AG can be received for up to 32 months, with the duration of the entitlement period depending on age and the length of contributions to the scheme.<sup>16</sup>

If AG is exhausted, or if the employee is not eligible for AG, he can claim AH. A condition for receiving AH in case of non-eligibility for AG is having been in insured employment for at least 150 days during the prior year. Like AG, AH is based on previous earnings; it amounts to 57 percent of previous net earnings (50 percent for employees without children). AH is means tested, and its duration is unlimited.

Both AG and AH are granted conditional on the recipient's agreement to accept reasonable employment (*zumutbare Beschäftigung*) and are not subject to income tax.

### **Wage-setting institutions**

In Germany, wages are determined by (annual) negotiations between unions and employer federations (tariff parties, or *Tarifparteien*). Workers are represented in collective bargaining by unions that are organized nationwide according to industries (see Schmidt 1994 for more details). Union membership is not tied to a particular job or firm; union workers usually remain with the union irrespective of their mobility decisions, as well as through spells of non-employment.

Collective bargaining takes place on industry and regional levels. During negotiations, parties have legally guaranteed autonomy. The results of the negotiations are laid down in tariff contracts (or *Tarifverträge*), which determine working conditions and wages. These contracts are registered at the Ministry of Labor. Since the union is the legal representative of all workers covered by collective bargaining (irrespective of the workers' union status), collective agreements apply to all workers within the respective segment.

There are no legal minimum wages in Germany; however, tariff contracts which specify wage levels for specific groups in specific sectors can be considered as an elaborate system of minimum wages.

To enforce their bargaining position, unions have the right to call strikes and employers have the right to lock out employees (*Aussperrung*), although this latter instrument is regulated by a number of legal rules. If the two parties have difficulties reaching a compromise, they may call for a mediator. The legal rules concerning the bargaining procedures, as well as the commitment that binds the two parties to the agreed contract, are laid down in the tariff contract law (*Tarifvertragsgesetz*).

## DATA

We use administrative data from Social Security records for Germany, and payroll taxes for France, in some cases supplemented with data from other sources. We briefly describe these data sources below.

### France

#### Base data set

The base data set for France is the Annual Social Data Reports (Déclarations Annuelles des Données Sociales, or DADS), which is a random 1/25 sample of the French population.<sup>17</sup> All people born in October of an even-numbered year, with the exception of civil servants (but including those employed by publicly held companies), are in the data set whenever they are employed.<sup>18</sup> These data cover the period 1976–1996, with the exception of 1981, 1983, and 1990, since the French National Statistics Institute (INSEE) did not collect the 1/25 sample in those years. These data include earnings information from all employers of all of these individuals, with both individual and employer identifiers attached to each year-individual-enterprise-establishment observation.<sup>19</sup> We also have the number of days worked during the course of the year and the job start and end dates (if the job began or ended during the year). We impute information using auxiliary regressions run on other data sets to determine the job start dates for the left-censored spells.<sup>20</sup> Temporary layoffs (of a length shorter than one calendar year) are not considered as interruptions of an employment spell. With this information, we can calculate seniority at each job for each year. We observe seniority, gender, age, occupation, region, full- or part-time employment status (but not hours), and sector on all jobs held by the individual, and we can measure the length of non-employment spells between jobs.

There are two problems with using this data set to study displaced workers. First, we do not know education, marital status, or number of children, for example. The Permanent Dynamic Sample (*Echantillon Dynamique Permanent*, or EDP), provides some additional information though. INSEE collected data on individuals born on the first four days of October that could be located in the 1968, 1975, 1982, or 1990

censuses, or for whom one of the following was available: the individual's birth, marriage, or death certificate or the birth, death, or marriage of a parent or child of the individual concerned. Most of the demographic information of interest comes from matches with the censuses. Since the EDP sampling frame overlaps that of the DADS in even-numbered years, it was possible to obtain a data set with all of the relevant variables from the combination of the DADS and the EDP.<sup>21</sup>

The remaining problem is to know the reason behind a separation.<sup>22</sup> We use a two-step approach to identifying displacements, or more precisely, firm deaths.<sup>23</sup> First, we use the Unified System of Enterprise Statistics (*Système Unifié de Statistiques d'Entreprise*, or SUSE), to determine the last year in which the employing firm filed accounts with any of France's administrative authorities.<sup>24</sup> We then look at all of the observations in the DADS that correspond to a given enterprise (not establishment). If the last year in which we observe data corresponding to the enterprise is 1996, we consider all separations from that employer as being for reasons other than firm death.<sup>25</sup> If, on the other hand, we observe a firm for which the last year with DADS data is, say, 1985, we compare this date to the date found in the SUSE (where available). We consider the latter of the two dates for a given enterprise as its estimated death date, and we consider enterprises that filed accounts or were paying employees in 1996 as ongoing.

For the "dying" enterprises, we attempt to control for false firm deaths (change of firm identifier without cessation of activity) with the following procedure. Given that we only observe a random sample of 1/25 of any firm's employment, we apply the procedure only to firms with at least three observed employees.<sup>26</sup> For these firms, we test the hypothesis that 50 percent or more of the firm's actual employees leaving the enterprise at its estimated death date were employed by the same subsequent employer, conditional on the total number of observed employees and the share of those who move together to the same subsequent firm identifier. This procedure is described in detail in Appendix A.<sup>27</sup>

Based on this dating procedure and correction, we construct two definitions of displacement. In the first, the worker separates from the firm within the calendar year preceding the calendar year of the firm's death.<sup>28</sup> In the second, we widen the window to two years preceding the

year of the firm's death. We report below results based on the two-year window definition, since our procedure for dating firm deaths is not very precise (particularly when SUSE data are involved) and because advance-notice provisions may mean that some workers separate from their firm prior to its actual shutdown (see Appendix B).<sup>29</sup> All other separations are classed as "other separations."

It should be noted that, given the sampling scheme of the DADS, this approach over-attributes separations to the "displaced" category. This is even more likely to be the case for separations from small firms, especially when the separation occurs near the end of the sample period. Our selection criterion reduces the risk of this source of over-classification somewhat (see below). Nevertheless, all of our results for France should be interpreted with this in mind.<sup>30</sup>

### **The sample retained for analysis**

From the overall data base, we focus in particular on men between 26 and 50 years of age with four or more years of seniority in 1984.<sup>31</sup> These restrictions were imposed so that we could restrict our attention to adult,<sup>32</sup> high-attachment workers without a risk that they would take early retirement in the later years in the sample.<sup>33</sup> We exclude all individuals with more than three different employers in any given year, as well as all individuals who held multiple jobs simultaneously at any point during our analysis window.<sup>34</sup> As a further control against early retirement, our duration analyses exclude all workers who, following separation from their employer, experienced a censored non-employment spell that pushed them above 56 years old (the minimum age for men to receive early retirement). Appendix C shows the differential effect of imposing this latter restriction by age at separation.<sup>35</sup>

We focus on individuals observed during the window of 1984–1989 for three reasons. First, given our definition of firm death for workers not matched to SUSE firms, we wanted to allow a time period after the end of the analysis period during which we might observe people in a "dead" firm, in order to minimize incorrect classifications. Second, given the data missing from 1983 and 1990, this is the longest period without interruption in our data. Finally, this sample window makes the French data comparable with the German data (see below).

In general, we concentrate on the first separation observed for the individual in the sample window (1984–1989), and, in so doing, ignore



the issue of multiple displacements (Stevens 1997).<sup>36</sup> As mentioned above, our data include information on the year, age, education, seniority, log real annual gross earnings, sector of activity, skill level (unskilled blue-collar, skilled blue-collar or white-collar), region and, of course, the reason for separation (displacement or other, calculated according to the procedures described above), if it occurred. Appendix D provides descriptive statistics for the full sample in 1984.

For the analyses of displacement incidence and earnings changes surrounding separations, we aggregated our data to one observation per individual per year.<sup>37</sup> In years preceding the separation, if the individual was employed by the employer from whom he or she will eventually separate, we keep the descriptive information (sector, occupation, seniority) corresponding to that job. For all other individual-year combinations, the descriptive information corresponds to the job the person held for the longest duration during the year, and in the case of ties, the job that provided the highest gross earnings.

The earnings measure used for the French data is the log of Total Average Real Daily Earnings,<sup>38</sup> corresponding to the log of the average of daily labor earnings from all sources, weighted by the number of days worked in the particular job (measured in thousands of 1980 francs).<sup>39</sup> The precise formula is

$$(1) \quad LARDE_{i,t} = \log \left( \frac{\sum_{j \in J(i,t)} \left( \frac{RAE_{i,t,j}}{dw_{i,t,j}} \right) dw_{i,t,j}}{\sum_{j \in J(i,t)} dw_{i,t,j}} \right)$$

where  $RAE$  is the real gross annual earnings received by individual  $i$  in year  $t$  from firm  $j$ ,  $dw_{i,j,t}$  is the number of days worked by individual  $i$  in firm  $j$  during year  $t$ , and  $J(i,t)$  is the set of firms  $j$  in which individual  $i$  worked during year  $t$ .

## Germany

### Base data set

The data used for Germany, which will be referred to as the IAB data, are comprised of three components. The core data are drawn

from the *Beschäftigungsstichprobe* (BS) of the *Institut für Arbeitsmarkt- und Berufsforschung* (IAB) in Nürnberg. The BS is a 1 percent sample from the overall employees' statistics, the so-called historic file *Historikdatei* (HD), of the Federal Department of Employment in Nürnberg, which is constructed as an insurance account, and contains a continuous employment history for each employee covered by the social security system. The BS is drawn in two stages (see Bender, Hilzendegen, Rohwer, and Rudolph 1996 for details) and covers a period of 16 years (1975–1990). It comprises 426,363 individuals in the longitudinal dimension and, on average, around 200,000 individuals in the yearly cross-sectional dimension.

On January 1, 1973, an integrated reporting procedure for health, retirement, and unemployment insurance was introduced in Germany. The data collected using this process form the basis for the HD. The procedure requires employers to report any commencement and termination of an employment relation which is subject to social security contributions. Additionally, to guarantee continuity in the registration of employment histories, employers have to provide information on every ongoing employment relation which is subject to social security payments on December 31 of every year. The information reported by the employer each time includes individual characteristics, such as gender, nationality, and educational attainment, as well as gross earnings over the past employment spell which served as the basis for social security contributions.<sup>40</sup> Furthermore, the HD also contains information on spells of interrupted employment relations, like maternity leave or obligatory military and civil service.

The HD does not include individuals who are below the earnings threshold which makes social security contributions compulsory unless they have been in an employment relation which was subject to social security contributions at an earlier stage of their career. It further excludes the self-employed, state civil servants, and individuals who are in compulsory military service or alternative compulsory activities. For 1980, Herberger and Becker (1983) estimate that the HD comprises 79 percent of the total labor force.

In addition to information available in the BS, the IAB data contain information from a second important data source, the *Leistungsempfängerdatei* (LD) of the employment office. The LD contains data covering spells for individuals who received certain benefit payments from

the Federal Department of Employment. These payments include unemployment benefits, unemployment assistance, and payments while participating in training and retraining programs. This additional data source allows us to follow individuals during periods of registered non-employment, too. It is important to note, however, that not all spells of registered non-employment are included in the LD. For instance, active labor market programs (*Arbeitsbeschaffungsmassnahmen*) are not covered. Furthermore, individuals have to fulfill certain requirements to be eligible for unemployment benefits or unemployment assistance (see above). Those who do not fulfill these requirements are likewise not included in the LD.

The IAB data set combines information on individual employees (from the BS and the LD) with plant information. Every individual in the HD is associated to a plant with a plant identifier. In a separate step and using the entire database, information about individuals is regrouped at the plant level. This allows us to add plant information to individual records contained in the IAB data. In particular, information about plant size and the educational structure of the workforce, as well as industry information, is added. The plant-level statistics, however, concern only those individuals who are covered by the social security system.

### **The sample retained for analysis**

From the overall database, we extract a sample of high-attachment workers. We select male workers who were between 25 and 50 years old in 1984. We use this age group to avoid including separations for early retirement and to exclude individuals who might not yet have finished their schooling.

Although our observation window covers the period between 1975 and 1990, we concentrate our analysis on the last decade. The reason is that the earnings information before 1984 is only of limited use. Until 1983, whether wages reported to the authorities contained additional payments, like holiday or Christmas money, was up to discretion of the employer. It was compulsory to include these payments after 1983. Additional payments constitute a substantial part of the wage bill of German employees—around 7 percent (see Dustmann and VanSoest 1997). Furthermore, these payments are likely to be correlated with variables like seniority, industry, and firm size. For these reasons

we decided to use earnings information only for the period between 1984 and 1990.

We select all workers who had been continuously employed with the same establishment for at least four consecutive years in 1984. Between 1984 and 1990 (the last year of our observation window) these workers either stayed with their establishment or they separated. Temporary spells of unemployment or non-employment with subsequent continued employment at the previous plant are not considered as separations.

We distinguish two types of separations: separations due to plant closure and separations for other reasons. We define a worker as a displaced worker if his separation is related to the establishment closing down or to a significant reduction in the number of employees. We adopt three alternative definitions: a worker is displaced if his plant closes down within one year of his departure (definition 1), within two years of his departure (definition 2), or if he separates from a plant at which employment falls by at least 40 percent within two years of his departure (definition 3). A plant closure occurs if the number of employees within a plant drops to zero.<sup>41</sup>

The strictest definition is the first one. By using this definition, we may exclude workers who left earlier because they foresaw a closure, or who were dismissed while the firm cut down on size prior to closure. The last definition avoids this problem, but it may include workers who separate for other reasons. In most of the analysis, we adopt the second definition. We use the first and last definition to check the robustness of our results. Appendix Table 5.B1 describes how these measures differ.

Another problem with the type of data we use is censoring. If individuals lose their jobs, they may or may not return to the sample within the observation window. Those who do not return may change into states not recorded by our data, like nonparticipation, retirement, self-employment, or civil service; they may also leave the country. This type of censoring is a particular problem with administrative data. The question is how to treat censored observations. Analyses of non-employment duration, or reemployment probabilities, are sensitive to the definition of the underlying sample and have to be understood in that light. We decided not to impose any restrictions; results should

therefore be understood as referring to the whole population of workers conditional on separation or displacement.

For illustrative purposes we use information about whether individuals claim unemployment insurance or unemployment assistance after separations as a device to sort out individuals with a high likelihood of leaving the sample. After at least four years of continuous employment (which is one of our criteria to enter the sample), every individual is, in principle, eligible for both types of benefits. Workers who intend to return to the labor market are most likely to claim benefits. We single out workers who do not return to the sample after separation and who do not claim benefits. Appendix E splits up the total sample of workers who separate from a firm into those who return into employment within the observation window (74 percent) and those who do not (26 percent). Of those who do not return, 30.6 percent claim benefits.

Appendix F displays sample statistics of worker characteristics for the year 1984: we distinguish among workers continuously employed between 1980 and 1990; workers whose first separation between 1984 and 1990 was a displacement (where displacement refers to separation from a plant within two years of the plant closing down); and workers whose first separation between 1984 and 1990 was for unknown reasons.

The numbers in the table indicate that average gross daily earnings of workers who are in continuous employment over the entire period are higher than those of workers who separate for unknown reasons or who are displaced. Continuously employed workers also have higher seniority in 1984, with more than 44 percent being with their firm for more than 10 years (as compared to 27 percent for displaced workers, and 24 for workers who separate for unknown reasons). Interesting are the numbers on plant size, which we measure in 1982, two years before any closure can take place in our sample. The average plant size for continuously employed workers is 3,086, as compared to 1,653 for other separations, and 160 for displacements. Accordingly, workers who are displaced according to our definition separate predominantly from small firms. The distributions are not symmetric, as indicated by a comparison between the median and the mean.

## The Incidence of Displacement in France and Germany

We address the question of the incidence of permanent job loss, or displacement, in our data by two approaches. First, we look at the share of observations that correspond to displacements and separations for other reasons in our data, and then we estimate probit models of the incidence of displacements and other separations. We follow different approaches for the two countries.

For France, we consider the share of individuals in a given year who experience each sort of separation. Whereas Table 5.1 breaks annual incidence for our sample down by year, we restrain our attention to the 1984 sample year for the decomposition of the incidence of separation and the estimation of its determinants in Tables 5.2 and 5.3. This is because all individuals in the 1984 sample year have at least four years of seniority on their first job that year, whereas individuals observed in later years may be on postseparation jobs with low seniority, and thus the distribution of job types in later years will not necessarily be comparable with that of the year on which the sample selection criterion was applied.

For Germany, we split our sample into three groups: Those who are continuously employed with the same firm over the entire period between 1980 and 1990 (32,594 individuals), those whose first separation (after 1984) is a displacement (3,273 individuals), and those whose first separation (after 1984) is a separation for unknown reasons (12,933 individuals). In Table 5.4, we display characteristics of these three samples, where the decomposition is by variables measured in 1984. In Table 5.5, we estimate simple probability models, which relate the probabilities of being in any of the three groups to individual characteristics, again measured in 1984.

### France

Table 5.1 describes the incidence of permanent separation, defined as the share of individuals in a given year experiencing a given type of permanent separation, in our data for all unique individual-year combinations.<sup>42</sup> Note that, as we are aggregating jobs to the individual-year level, a person can experience both displacement and other separation in the same year. Thus, the sum of the number of individual-years with displacements and other separations may exceed the number of indi-

vidual-years with any separation. This table covers all separations that occur in our sample window, not just first separations, since (as noted above) considering only first separations would bias our sample increasingly toward stable individuals in the later years, thereby seriously underestimating the incidence of separation toward the end of our sample window. The spike in 1989 is due to the fact that we are missing data from 1990 (see below), and our coding algorithm would attribute all changes in employer identifier between 1989 and 1991 to the 1989 observation year, whereas at least some changes in employer certainly occurred during the (missing) 1990 observation year.<sup>43</sup> We include women as a reference, although in what follows we restrict our attention to men.

We find that the incidence of separation increased in France to a peak at 1987 for both men and women, and then declined in the remainder of the sample window. Whereas the share of individuals experiencing displacements seems to have peaked in 1988 for men, the figures for women suggest a peak around 1986. The increase for men toward the end of the sample is likely related to the onset of the recession that began in the early 1990s, while the peak for women in 1986 corresponds to the slump that began in mid 1986 and ran through spring 1987.<sup>44</sup> Furthermore, there seem to be no major, consistent differences between men and women over the entire sample period in terms of either the share of separations in the total or the share of displacements. Since maternity leave, albeit generous by North American standards, typically does not last longer than a full calendar year, and since women are guaranteed a job with their previous employer upon returning from maternity leave, such a lack of differences in separation and displacement rates is less surprising.<sup>45</sup>

A similar breakdown of our data, aggregated to the individual-year level, by seniority on the lost job and by age, all measured in the 1984 data year is presented in Table 5.2. Although 96 individuals experienced both a displacement and another separation, we count only the first separation in the top half of the table, since the elimination of multiple-job holders implies that the second separations are from low-seniority jobs that follow the first separation.

Table 5.2 shows that, although there is a clear decline in the share of separations in total observations and the share of displacements in total observations with previous job seniority in France (with the

exception of the relatively underpopulated 8–10 years of seniority category), the share of separations represented by displacements (defined as separations in the two calendar years preceding the calendar year of firm closure) is relatively invariant to seniority, and may even be slightly increasing.<sup>46</sup>

Although the share of displacements and separations in the total seems reasonable by North American standards, the share of separations attributed to the displaced category is quite high. This is likely due to two main reasons. First, given the sampling frames in our data, most departures from small firms will be classed as displacements, since the chances of observing another sampled individual in the firm or observing firm financial data after the separation are very low. Second, we are classifying separations occurring in a relatively long window preceding the calendar year of firm death as displacements. This approach will mislabel all separations that occur within the window but are independent of the firm's impending demise as displacements. Unfortunately, given our data constraints, there is little we can do about these problems.

A final point worth noting regarding Table 5.2 is that the share of individuals experiencing a displacement, or any sort of separation, is highest for the youngest and oldest age categories. Given that younger workers are less stable than older workers, the results for young people are not surprising. Despite our restraining our attention to workers who are at most 50 years old in 1984, the possibility that some of these workers' employers may offer exceptional early retirement plans could explain the results for older workers.<sup>47</sup> For this reason (as mentioned above), we impose an additional control for early retirement in our analyses for postseparation non-employment durations.

In order to get a more precise view of the determinants of displacement, we estimate probit models of the incidence of 1) displacement, 2) other types of separation, and 3) all separations combined on our data from 1984. The reference category is all alternative states (other separations and no separations for model 1, displacements and no separations for model 2, and no separations for model 3). Constraining ourselves to 1984 data provides us with estimates of the determinants of annual probabilities of each sort of separation, and has the advantage of substantially reducing the risk of separations into early retirement, as



the oldest workers at this date are 50 years old. Table 5.3 presents the results of these models.<sup>48</sup>

The table suggests that the highest educational categories are the most likely to separate for reasons other than firm closure, while the only diploma that affects displacement is an advanced vocational education (which reduces the risk of displacement relative to those without any educational certification). The probability of both displacement and other sorts of separations is not significantly related to age in 1984, a result which has also been found for the United States (Seitchik 1991). However, the most senior workers are clearly less likely to experience a separation, *ceteris paribus*, among the workers in our sample. Although the differences among 4–6, 6–8, and 8–10 years of seniority are not significant, all have a significantly higher probability of experiencing a displacement than workers with 10 or more years of seniority. These results are consistent with Table 5.2 and further reinforce the idea that the incidence of worker displacement declines with the seniority of the worker. Similar results are found for workers with 4–8 years of seniority (relative to 10 and above) when considering separations for other reasons. Many theoretical models predict a decline in mobility with job seniority, so this result is not surprising.

### Germany

In Table 5.4 we report numbers on continuously employed workers over the period 1980–1990 (our reference group), and the number of displaced workers and workers who separate for unknown reasons during our sample window.<sup>49</sup> Recall that our selection criterion is that all workers joined the plant in 1980 or earlier. Seniority and age refer to 1984.

On average, 6.71 percent of all workers who have been in continuous employment with one firm between 1980 and 1984 experience a separation between 1984 and 1990 because the plant closes down. This percentage is slightly higher at the lower seniority levels, and lower at the higher seniority levels, indicating that plants which close down tend to have workers with lower levels of seniority. One reason may be that these plants are younger. There is no clear age pattern; displaced workers account for 20.19 percent of the by-age sample of separated workers.

Among the continuously employed workers, 44 percent have been with the same plant for at least 10 years in 1984; for displaced workers and workers who separate for unknown reasons, this number is lower: 26 percent and 24 percent respectively. Accordingly, although we used the same selection criterion to construct our samples (to have been with the same firm for at least four years in 1984), the distribution of seniority differs according to their future separation status. The age distribution is more similar among the three groups, with more than 70 percent of workers concentrated in the age range between 30 and 50.

To investigate the effect of observables on the separation and displacement probability in finer detail, we estimate simple probit models (Table 5.5), where the dependent variable is equal to 1 if the individual is displaced or separated for unknown reasons (“other separations”) over the period 1984–1990.<sup>50</sup> The values of regressors refer to 1983, the last year before a separation could take place. The benchmark group are workers who are continuously employed with the same firm between 1980 and 1990.

We first discuss displacement. The estimates compare characteristics of workers in plants which close down between 1984 and 1990 with characteristics of workers in plants which do not; this is conditional on the two groups being employed for at least four years in 1984, and the latter group being employed between 1980 and 1990 with the same plant.

Age has a nonsignificant effect on the displacement probability (Table 5.5). This may be interpreted as an indication that the age structure of workers in firms which close down is not different from that of the reference group. The displacement probability decreases slightly with seniority—workers affected by a closure over the 1984–1990 window are characterized by less tenure than workers who are not. The benchmark for the education categories are workers without apprenticeship and without a high school degree. The negative signs of higher education dummies indicate that the skill mix of workers affected by displacement is weighted toward lower education groups, compared to our reference group.

The results for “other separations” are quite different. Remember that workers separated for unknown reasons include workers who are fired for cause, as well as workers who quit. Here, age has a strong negative effect. This is to be expected, given that age should affect the

separation probabilities for both groups of workers in this category negatively. First, firing of workers becomes more expensive the older they are because of institutional regulations; and second, age is positively related to the match quality, and the mobility of workers decreases with age. Unlike displaced workers, higher education now has a positive effect on the separation probability. This may indicate a higher degree of mobility for the well educated.

### **Durations out of Work**

In North America, displaced workers often experience periods out of work following their displacement prior to finding another job. In the more heavily regulated labor markets of France and Germany, advance-notice requirements are meant to reduce or eliminate periods out of work. The analysis of non-employment durations following displacement in France and Germany may provide additional insight into the functioning of the labor markets in these countries, and into the role that differences in the institutional environment might play in determining the speed of reemployment. In both countries, we focus on the first separation that occurs within our sample windows.

#### **France**

Table 5.6 breaks down all first separations in our data by seniority and describes the share of separations which are followed by a period out of work. This is further broken down into displacements and other sorts of separations.

The numbers in Table 5.6 demonstrate that the percentage of those who experience a non-employment spell after separating from the firm declines with seniority in France. Furthermore, the share of positive-duration non-employment spells is lower in general for displaced workers than for workers who separate for unknown reasons, with the difference being the most flagrant for the least senior workers.

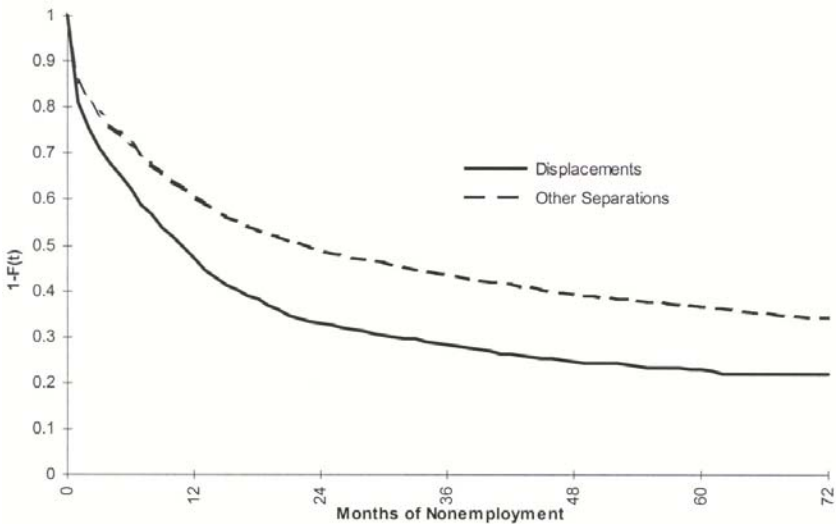
Overall, Table 5.6 shows that approximately 22 percent of workers who lose stable jobs because of firm closure never experience an interruption in their employment histories as a result of their displacement. This may be due to the employment-protection legislation described above. In fact, given the rigidity of the employment-protection legislation and the long advance-notice periods it implies, one might wonder

why the share of direct transitions is not higher. This is probably due to the length of the window we use for defining displacement, which includes separations that are not necessarily related to the firm closure and thus do not necessarily benefit from such generous employment-protection legislation.

To offer a sense of the duration of non-employment spells when they do occur, we show the Kaplan-Meier estimates of the nonparametric survival functions of postseparation non-employment spells for all spells of positive duration (in Figure 5.1). Note that these results are conditional on experiencing a non-employment spell of positive length, and that (as is always the case in duration modeling) our estimates are sensitive to the treatment of censored observations.<sup>51</sup>

Displaced workers clearly leave non-employment at a faster rate than workers who separate for other reasons. These differences are highlighted by the differences in long-term non-employment between displaced workers and those who separate for other reasons. In France, less than 18 percent of displaced workers who experience a non-employment spell are still without employment five years after displacement, while roughly 30 percent of workers who separate for other

**Figure 5.1 Kaplan-Meier Survivor Functions, France**



reasons and enter non-employment are without a job five years after separation.<sup>52</sup>

Of course, the differences between displaced workers and other separators in France may only be superficial: the Kaplan-Meier survivor functions we have drawn in Figure 5.1 do not consider the differences in the characteristics of the two populations. It may simply be the case that other separators have characteristics that make finding a new job harder and, thus, these workers would take longer to find new jobs irrespective of the reason for the separation. To control for observable heterogeneity in the populations, we estimate durations of non-employment by using proportional hazard models with Weibull-distributed baseline hazards for France.<sup>53</sup> The effects of different covariates on non-employment durations following separations are given in Table 5.7 for workers with at least four years of seniority on the job of their first separation.<sup>54</sup>

We estimate models with 1) both types of workers and an indicator variable for firm closure, as well as separately for 2) displaced workers and 3) workers who separate for other reasons. The first specification is equivalent to imposing an identical baseline hazard and identical coefficients on all covariates except the constant across the second and third specifications.

Table 5.7 shows that the shape parameter of the Weibull model is always less than 1, indicating that the conditional probability of leaving unemployment decreases over time (decreasing hazard). This is consistent with the nonparametric hazard underlying Figure 5.1. The results in the first column show that individuals who separate because of a closure have a higher conditional probability of reentering employment than individuals who separate for other reasons. This can be explained by the set of individuals in the samples we are analyzing; since we only consider individuals who experience a non-employment spell of positive duration, the group of workers who separate for other reasons may consist mainly of workers who were fired for cause.

Seniority in the pre-separation firm seems to slow exit from non-employment in France for both sorts of separations, and this effect seems slightly stronger for displaced workers (relative to those who separate for other reasons). In general, most types of education seem to help workers leave non-employment faster, relative to workers without any degree, although which degrees help the most varies by reason

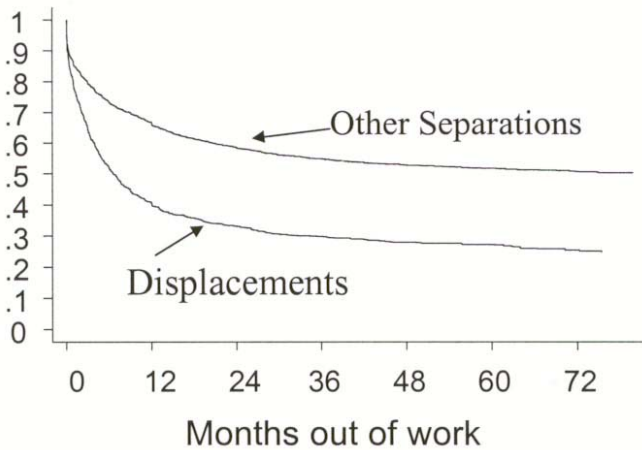
for separation. For displaced workers, those with an advanced vocational school or a graduate school or grande école degree find new jobs the fastest, while among workers who separate for reasons other than firm closure, the degrees that count are a high school baccalauréat, an undergraduate, or a grande école or graduate school degree (the vocational degrees are marginally less important). The results for displaced workers suggest the importance of being able to signal a particular competency after one's firm closes via an advanced vocational certification or a relatively specialized graduate degree. One explanation could be that since firm closure is such a dramatic event, when a firm closes it may be a sign of ill health in the industry in general. As such, workers who are able to point to advanced skills may find it easier to get new jobs than those whose abilities are more closely linked to their previous employer's industry. The results for other separators may reflect the value that a more general education might have in counterbalancing the negative signal sent by a firing for cause, as well as the extensive networks that some grandes écoles have available to help place their alumni who might otherwise have difficulty.

### **Germany**

The number and the percentage of workers who experience a non-employment spell in Germany are reported in Table 5.8. On average, about 50 percent of workers who separate from their firms immediately find another job. The number is slightly lower for displaced workers (39.5 percent), and slightly higher for workers who separate for unknown reasons (51.6 percent). The likelihood of a non-employment spell decreases slightly with job tenure, particularly for displaced workers.

Figures on non-employment include all individuals who do not experience a job-to-job transition, including individuals who leave the labor force into other states (see discussion above). The numbers are therefore not directly interpretable as the percentage of individuals who experience non-employment after a separation and would like to remain in the labor market. Figures for this type of worker will generally be lower.

Next, we investigate the duration of spells of non-employment for those individuals who experienced a non-employment spell after separation. Figure 5.2 shows the Kaplan-Meier estimates of the survival

**Figure 5.2 Kaplan-Meier Survivor Functions, Germany**

functions of postseparation non-employment spells for all spells of positive duration. Observations are treated as censored if they have not reentered the workforce at the end of the observation window (December 1990). The graphs indicate that displaced workers leave non-employment at a faster rate than workers who separate for other reasons.

In order to learn about the relation between individual characteristics and the conditional probability of reentering employment after a separation, conditional on having had a non-employment spell, we estimate durations of non-employment using Cox models, which avoid parametric assumptions about the baseline hazard. The effect of different covariates on non-employment durations following separation are given in Table 5.9. We estimate the models separately for displaced workers and workers who separate for other reasons.

In the first model, we do not distinguish between the two types of separation. We include an indicator variable which is equal to 1 if separation is due to closure. As already indicated by the Kaplan-Meier estimates, workers who are displaced and experience a subsequent non-employment spell are more rapidly reabsorbed by the labor market

than workers who separate for other reasons. This latter group is likely to include primarily workers who were dismissed for cause, since workers who quit because they received better outside offers are unlikely to experience non-employment spells after separation.

The seniority variables refer to seniority prior to separation. Seniority plays no role in changing the rate of exit from non-employment for workers who are displaced for unknown reasons, but it increases the conditional probability of a return to work for displaced workers. Recall that seniority also reduces the probability of experiencing a non-employment spell for these workers. Age has a negative effect for both groups, indicating that older workers find it more difficult to get a job offer than younger ones, regardless of the reason for separation. The educational indicators are marginally significant. They indicate a negative relationship between education and the conditional probability of exit from non-employment for displaced workers. This may reflect the higher level of benefits for educated workers.<sup>55</sup>

### **Earnings before and after Separation**

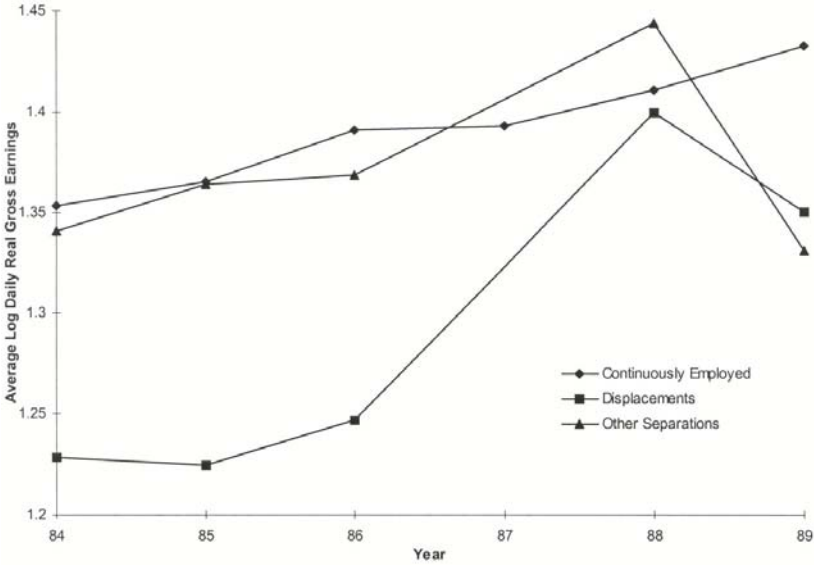
The literature notes that wage losses occur, in particular, for workers who lose jobs in which they had a high level of seniority. It has also been noted that these wage losses begin prior to displacement, and that measuring wage losses by comparing only the final wage on the job from which the worker was displaced with the new wage is likely to underestimate the size of these losses. In this section, we describe the time paths of daily earnings and changes in earnings growth in the years surrounding separations.

#### **France**

Figure 5.3 plots average daily earnings for French workers who were continuously employed over the at-risk period (1984–1989), workers whose first separation was a displacement during that period, and workers whose first separation was for another reason during that period. We include only individuals with strictly positive average daily earnings for our calculations.<sup>56</sup> For expository purposes, we look in particular at individuals whose first separation took place in 1987, if



**Figure 5.3 Average Daily Earnings Over Time by Type of Separation, France**



at all. We consider separations from all years combined starting with the next table.

In France, average daily earnings increased faster between 1986 and 1988 for workers displaced in 1987 than for workers who were continuously employed over the entire 1984–1989 period with the same employer and for those whose first separation was in 1987 and for reasons other than firm closure. Figure 5.3 illustrates that average real daily earnings grew by 2.01 percent for continuously employed workers between 1986 and 1988 and by 7.80 percent for other separators over the same interval, while average daily earnings jumped by 16.43 percent for displaced workers across the 1986–1988 interval.<sup>57</sup> Part of this might be due to what is called “partial unemployment” in the period leading up to firm closure. In France, a firm can negotiate a contract with the unemployment insurance fund to put its workers on partial unemployment, in which case the worker receives a fixed fraction of his or her prior salary with the costs split between the employer

and the unemployment insurance fund. The worker does not report to work, but maintains the employment relationship. If employers report only their (lower) share of the (lower) workers' earnings paid during this period while not reducing the reported number of days for which compensation was paid, this would artificially lower the predisplacement earnings level. However, Figure 5.3 does not show such a pre-separation drop in relative earnings, and even if such a phenomenon were present, it seems unlikely that average daily earnings in France would decline around separation.<sup>58</sup>

Another interesting point to draw from Figure 5.3 is the order of earnings levels among the three categories. It appears that in the time before separation, displaced workers have earnings that are, on average, lower than other sorts of workers, be they continuously employed or separated for reasons other than displacement. Workers who separate from their employers in France for the first time (in the 1984–1989 window) by displacement in 1987 earn 11.8 percent less in 1984 than those whose first separation is for other reasons, who in turn earn 1.3 percent less than workers who are continuously employed over the whole period. During the period preceding separation, there seems to be very little difference between continuously employed workers and those who separate for reasons other than displacement, while throughout this period displaced workers earn less. Still, in the period immediately after the separation, average daily earnings for displaced workers who have found new jobs have almost completely caught up with continuously employed workers, being only 1.2 percent below, while workers who separate for other reasons and are employed in the year after separation pull ahead of continuously employed workers, earning 3.2 percent more.

A final point worth noting is the dip in average real daily earnings between the year following separation and two years after separation, for both displaced workers and those who separate for other reasons. Since we are calculating the averages used to draw Figure 5.3 from employed individuals only, this dip (or rather, lack of recovery) could be due to a composition effect. It may be that workers who take longer to find a job after separation earn less on their new job than those who find their new job sooner (and already have a year of seniority). We explore this idea further below.

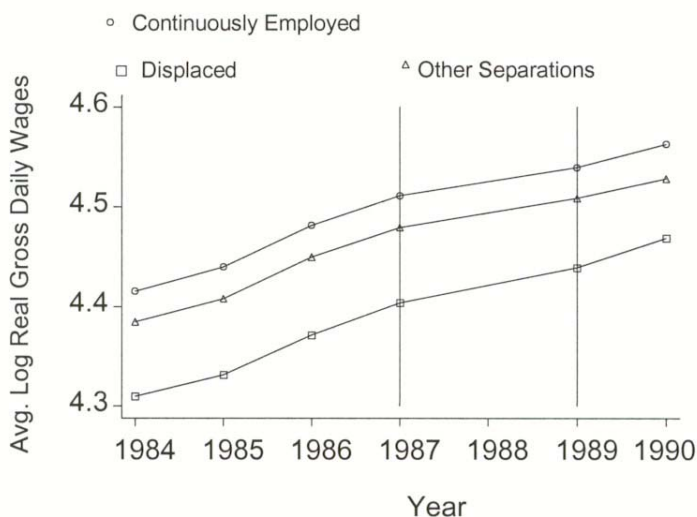
Table 5.10 considers the raw averages in more detail, looking at long differences (of at least two periods) in average daily earnings around the displacement or separation date by seniority (prior to separation), distinguishing among continuously employed workers, displaced workers, and workers who separate for other reasons. For the continuously employed, the table simply provides two-year differences in average real earnings. For displaced and other separated workers, the numbers refer to the earnings difference between the new job in the year after the separation year (if a new job has been found) and the old job in the year prior to the separation year. Otherwise the numbers refer to the difference between the earnings in the first year in which a new job has been found and the old job. We have also differentiated workers who are observed in employment, at the earliest, two calendar years after separation; we refer to these workers as “slow displaced” and “slow other separations.”

Table 5.10 confirms the intuition derived from Figure 5.3. Considering all displacement dates simultaneously, we find that displaced workers as a whole make faster earnings gains than continuously employed workers or workers who separate for other reasons. Earnings losses occur on average for both displaced and other separating workers who take more than a year to find a new job. Despite the fact that slow job finders make up a relatively small share of workers who eventually find jobs following separation within our sample window, it will become clear in our earnings regressions below that it is important to distinguish them from workers who find new jobs within the first calendar year after separation.

### **Germany**

Average daily earnings for German workers who were continuously employed over the at-risk period (1984–1990), workers whose first separation was a displacement and took place in 1988, and workers whose first separation was for another reason and took place in 1988 are plotted in Figure 5.4. The separation year 1988 is omitted. Only employed individuals contribute to the averages on which the figures are based. We do not include workers who are not employed in a given year after separation.

The figure indicates that displaced and other separated workers experience earnings growth at a rate similar to continuously employed

**Figure 5.4 Average Daily Earnings Over Time by Type of Separation, Germany**

workers between the pre- and postseparation year. Another interesting point is that it appears that displaced workers have daily earnings that are, on average, lower than other sorts of workers, be they continuously employed or separated for reasons other than displacement.

Table 5.11 considers the raw averages in more detail, looking at long differences (of at least two years) in average earnings around the displacement or separation date. We distinguish among different levels of seniority (prior to separation), and among continuously employed workers, displaced workers, and workers who separate for other reasons. For the continuously employed, the table simply provides two-year differences in average earnings. For displaced and separated workers, the numbers refer to the earnings difference between the new job in the year after the separation occurs and the old job in the year prior to the separation. Obviously, this includes only workers who have found a job in the year after separation. The columns “Displaced I” and “Separated I” report earnings growth of workers who are observed in employment, at the earliest, two calendar years after sepa-

ration. Although the earnings data are top coded—overall, 12.7 percent of the sample is affected in 1983 (see data section for details)—we do not account for this in Table 5.11. This point is considered explicitly below.

Table 5.11 indicates that average two-year earnings growth for continuously employed workers is 4.6 percent. Pre- to postdisplacement earnings growth for displaced workers and workers separated for unknown reasons are 2.8 percent and 3.2 percent, respectively. The numbers confirm the intuition derived from Figure 5.4 that workers who separate continue to make earnings gains. Gains have a slight tendency to decrease with seniority, but a clear pattern is visible only for workers separated for unknown reasons.

The picture looks entirely different, however, for workers who are only able to find a job, at the earliest, two years after displacement (“Displaced I” and “Separated I”). Here earnings decrease substantially: they drop by 7.3 percent for displaced workers and by 14.2 percent for workers who separate for other reasons. The large earnings loss of the latter group may reflect the likelihood that this group consists mainly of workers who have been laid off for cause.

A problem in our data is that we observe closures only at the plant level. Therefore, some plants may disappear due to reorganization, and workers may continue to work in the same firm, but in a plant with a different identifier. Although this event is not likely to be frequent, it may distort our results. On the basis of the data we have available, it is not possible to sort out these “false” plant closures.

Workers whose plants disappear because of a reorganization should appear as direct transitions. We have therefore computed earnings losses for displaced workers who have experienced a non-employment spell after separation lasting at least one week. This will most likely eliminate workers who change plant numbers for reorganizational reasons. However, it also restricts the sample to lower quality workers—workers who are not able to find a new job immediately. Accordingly, the corresponding numbers may be seen as lower bounds for earnings losses incurred by displacement. We report these results in the column, “Displaced II.” A total of 644 displaced workers experience a non-employment spell of at least six days after displacement and are reemployed in the year after displacement. Their average earnings loss is  $-1.46$  percent. Earnings losses are clearly higher for work-

ers with higher levels of seniority before displacement. This may be an age effect, or it may indicate the loss of firm-specific human capital incurred by these workers.

We conclude from these numbers that average losses incurred by displacement are, in the worst case, around 1.5 percent. At the same time, those workers who are continuously employed experience an earnings increase of about 4.6 percent. Assuming that this number reflects the earnings growth that workers who are displaced would have experienced had their plants not closed down, the worst case scenario is that the decline in earnings growth associated with a plant-closure-related displacement is about 6 percent. More serious earnings losses are experienced by workers who are not able to rejoin the labor market in the year after displacement, however.

### Regression Analysis of Pre- and Postseparation Earnings

In this section, we compare the pre- and postseparation earnings paths of displaced and continuously employed workers more generally. As a descriptive tool, we estimate simple earnings regressions on various subpopulations. The general estimation strategy is as follows.<sup>59</sup>

We regress the logarithm earnings on time-invariant and time-varying individual specific characteristics ( $x_i$  and  $z_{it}$ ), time effects  $\delta_t$ , and a vector of indicator variables  $k_{is}$ , which switch from 0 to 1  $s$  years after separation, or  $-s$  years before separation. Depending on the specification, the coefficients on the  $k_{is}$  variables measure the difference in the level of earnings of workers  $s$  years before or after separation and the earnings of either continuously employed workers, or the difference in earnings with respect to other workers who separate for the same reason measured in a reference year,<sup>60</sup> conditional on time effects and observable individual characteristics. We also add the variables  $ks_{t\tau}$  which take on the value 1 in the after-separation period for those individuals who are not observed in employment in the year after separation. The parameter on these variables,  $\xi$ , picks up a negative permanent effect for those individuals who remain out of work for more than one year after separation. Finally,  $u_{it}$  is a disturbance term. Thus, our estimation equation is as follows:

$$(2) \quad \ln \omega_{it} = X_i \beta_1 + z_{it} \beta_2 + \delta_t + \sum_{r \in \omega} ks_{ir} + u_{it},$$

where ( $w$ ) is the set of postseparation dates and ( $A$ ) is the set of pre- and postseparation dates (with or without an indicator for the year immediately preceding separation, depending on the specification).

### France

The results of estimating this model on average daily earnings in France are shown in Table 5.12.<sup>61</sup> To ease interpretation of the results, we replace the indicator variable for five years before separation with an indicator variable that takes on the value 1 for all individuals who separate (the variable *Separated*). This allows us to sweep out the average difference between separators and the continuously employed, and we can interpret the coefficients on the other relative year indicators ( $Sep_i$ ) in terms of an earnings path for workers who separate.

The first column compares workers who are displaced because of plant closure between 1984 and 1989 with workers who are continuously employed over that period. The second column compares continuously employed workers with workers who separate for unknown reasons. As mentioned above, these latter separations consist of voluntary quits and firings for cause. The variable *Perm* takes on the value 1 in all years following the first separation if it took the individual more than 12 months to find a job after displacement. As mentioned above, the variable *Separate* takes on the value 1 for all workers who separate, and the  $Sep_i$  variables assume the value 1 in the  $i$ th year prior to or following the worker's first separation. Thus the coefficient on *Separate* can be interpreted as the difference in earnings five years prior to separation for workers who will eventually separate from their employers relative to the continuously employed, and the coefficients on the  $Sep_i$  variables are interpreted as variations in earnings for workers who will eventually separate relative to their earnings five years before separation. Note that we are considering only the first separation as the reference in these regressions, and that we have excluded earnings in the separation year for workers who separate. The reason is that the earnings in the separation year may come from both pre- and postseparation employers, and the interpretation of this coefficient would be unclear.

Table 5.12 shows that, even after controlling for observable individual characteristics, workers who separate because of firm closure earn 8.8 percent less than continuously employed workers five years

prior to the actual separation.<sup>62</sup> This could be due in part to unobserved heterogeneity across individuals, in other words, to individuals employed by firms that will close who would be earning less anyway.<sup>63</sup> Alternatively, it could be that low-wage firms have a higher risk of going out of business than better paying firms.<sup>64</sup>

This gap increases slightly as the displacement date approaches, with the dip being significant only in the year immediately preceding displacement, in which earnings of displaced workers are approximately 2.8 percent lower than they were five years before displacement. Workers who separate for reasons other than firm closure start with earnings closer to the continuously employed (5.4 percent below), but the preseparation dip starts sooner (three years prior to separation) and is much larger, with earnings in the year preceding separation being approximately 5.1 percent lower than they were five years before separation.

Table 5.12 also shows that both displaced workers and other separators make earnings gains between the year before separation and the year after separation. However, as suggested by Figure 5.3 and Table 5.10, there is a significant additional penalty to taking a long time to find a job after separation. For displaced workers, slow job finders earn an extra 4.7 percent less than other displaced workers postseparation, while the penalty for slow job finding is more than twice as large (10.1 percent) for workers who separate for other reasons. The result for displaced workers could be interpreted in the context of a declining reservation wage, in which case workers who take longer to find jobs would have, on average, lower reemployment wages. On top of this “penalty” comes an additional negative signal for workers who separate for other reasons: For workers who take longer than a year to find a new job, the separations are more likely to have been firings for cause than voluntary quits, and thus these workers would receive, on average, lower wage offers as the market infers that they have a lower value of marginal product.

Finally, the earnings path in the postseparation period shows that, on average, the gains made by workers around the separation date are eliminated and become losses as time passes, so that displaced workers five years after displacement are earning essentially the same as they were earning in the year immediately preceding displacement. The postseparation decline is not as dramatic for workers who separate for



other reasons. Given the concave form of seniority returns in France, such a pattern is surprising, since returns are steepest in the first few years with an employer.<sup>65</sup> This declining pattern may suggest that our specification of a fixed-intercept shift in the postseparation period for all slow job finders may not be a flexible enough functional form to capture the heterogeneity in earnings that is correlated with the speed of reentry into the labor market.<sup>66</sup>

### Germany

Parameter estimates of Equation 2 for Germany, where we use the sample of displaced workers and the year preceding displacement as the reference earning level are displayed in Table 5.13. All regressions are tobit specifications, which take care of the top coding occurring in our data. The first column includes all workers who separate from a plant that closes down within two years of the worker's departure. Relative to the workers' average earnings in the year before a closure, displacement leads to a 1–2 percent wage decrease in the years after closure; four years after closure, their wage disadvantage relative to their position before a closure becomes insignificant. Workers who are not observed in employment in the year after displacement face a permanent additional wage loss of about 19 percent. Wages more than one year before displacement do not vary much from wages in the pre-displacement year.

We have run the same regression, using our alternative definitions for displacement. When considering a worker as displaced if he separates from a firm within one year of the firm's closing down (which reduces the number of observations to 13,539), the permanent loss for workers who have not rejoined the labor market in the year after displacement is again 19 percent; the average wage loss in the three years after displacement is 3 percent. Using the third definition (contraction by at least 40 percent), the respective numbers are 20 percent and 4.3 percent (this corresponds to 35,031 observations). All these numbers are fairly close, indicating that our results are quite robust to the definition of a displacement.

The second column in Table 5.13 reports results for displaced workers who experienced a non-employment spell of at least six days after separation. The permanent effect of not having found a job in the year after displacement reduces now to 12 percent (which is probably

due to a change in average wages of the reference group). Displacement is associated with a wage loss in the first job in the year after displacement of 4.1 percent, and of 2.0 percent two years after displacement, both relative to wages in the year before displacement. The difference becomes insignificant thereafter.

These results, which are quite robust to different definitions of displacement and different samples indicate that wage losses of displaced workers relative to their predisplacement wages are fairly moderate. Furthermore, there is a slight decline of wages in the three years before separation. As already indicated in Table 5.11, losses are substantial if the worker does not find a job in the year after separation.

In Table 5.13 we compare the wage position of a displaced worker after displacement to his predisplacement wage. Next, we estimate a specification similar to the one underlying the results in Table 5.13, where this time we pool displaced workers (or workers separated for unknown reasons) and continuously employed workers. We add an additional indicator variable for the year immediately preceding displacement. This gives us the wage profile of displaced (separated) workers, relative to continuously employed workers, in the years before and after displacement. Results are displayed in Table 5.14.

As already indicated in Figure 5.4, wages of displaced workers are, on average, 10 percentage points lower than wages of continuously employed workers. This difference may be due to firm effects, or may be a result of workers of lower quality selecting into firms which close down. The immediate pre- to post-wage difference is again small—about 0.9 percent. Compared with continuously employed workers, displaced workers continue to have lower wages. Again, those who are not in work in the year after displacement suffer substantial permanent losses.

The second column displays results for workers who separate from their firm for unknown reasons. Here, wages begin to decline about two years before separation, but do not differ from those of continuously employed workers before that. After separation, wages are on average 4 percentage points lower, as compared to those of continuously employed workers. Again, workers who have not found a job in the years after displacement suffer substantial losses.

## DISCUSSION AND CONCLUSIONS

In this section, we bring together the results from the two countries and briefly relate them to the existing literature from North American studies of worker displacement. It bears repeating that we focus on prime-age men in stable jobs (at least four years of job seniority). Furthermore, our definition of displacement, used throughout this chapter, is a separation within two years of firm closure in France and within two years of plant closure in Germany.

### Incidence

Worker displacement seems to be slightly more frequent in France than in Germany.<sup>67</sup> Among our sample of high-seniority workers, 2.78 percent experienced a displacement in France in 1984, whereas 6.71 percent of eligible German men had a displacement as their first separation during the 1984–1990 window (a seven-year interval). This suggests that a lower bound on annual incidence of worker displacement due to plant closures might be below 1 percent in Germany. Both of these numbers, and the German figures in particular, are lower than what has been found for the United States; Farber (1997) found a probability of experiencing a displacement of 6.9 percent for the 1984–1985 two-year period using the Displaced Worker Supplements of the Current Population Survey. However, this may be due largely to the fact that Farber (1993) considered all self-reported displacements, whereas (for data reasons) we restrict our attention to firm and plant closures.<sup>68</sup>

As a share of total separations, worker displacements are more important in France than in Germany. Part of this difference may be due to our different definitions of displacement (firm closure in France, plant closure in Germany).

In both France and Germany, age is not significantly related to the probability of displacement. The highest levels of education are negatively related to the probability of being displaced in both countries as is seniority in 1984. All of these results are generally consistent with what has been found for the United States (Fallick 1996).

## Duration

In both France and Germany, a large share of displaced workers transit to their subsequent employers without spending any time in non-employment. The share of direct transitions is always higher for displaced workers than for workers who separate for other reasons, and the share of displaced workers making direct transitions increases slightly with seniority. There is a larger share of direct transitions in the German data than in the French data, which may be due to the differences in the definitions of displacement (firm closure in France versus plant closure in Germany).

The durations of spells out of the workforce, when they occur, are shorter in both countries for displaced workers than for those who separate for other reasons. The long-term non-employment rate for displaced workers in France seems slightly lower (around 20 percent after five years) than that of Germany (around 27 percent), and the gap in the survivor functions between displaced and other separating workers is larger in Germany. Recall that our administrative data suffer from the problem of censoring—some individuals do not return into the labor force after separating from their job within the observation window. They may have changed into other states, like self-employment (in Germany), or retirement, or they may have left the country. Therefore, one has to be cautious when interpreting these results as durations in non-employment.

Estimations of duration models confirm the faster exit of displaced workers in both countries. However, displaced workers with high seniority tend to leave non-employment more slowly than those with low seniority in France, whereas the reverse is true in Germany.<sup>69</sup>

## Earnings Changes

In both countries, we find a result that is contrary to the majority of North American results on worker displacement. Displacement does not seem to be associated with large earnings losses. In the French case, average daily earnings of displaced workers actually increase, relative to continuously employed workers, between the year preceding and the year following displacement. In Germany there is still a small drop in average daily earnings relative to continuously employed

workers, but the drop is less than 1 percent in relative earnings terms. One explanation for our different results may be the way the earnings variable is constructed: While we use data on daily earnings, which are calculated using employment periods only, many North American studies use data on quarterly or yearly earnings, without taking account of the number of days worked. Furthermore, some studies (Jacobson, LaLonde, and Sullivan 1993) substitute zero earnings for workers who are not in work, while we construct our comparisons conditional on employment.

We do find an important earnings differential associated with taking longer than a year to find a new job following displacement for both countries. In France, this corresponds to a 5 percent earnings disadvantage relative to other displaced workers who are reemployed within the calendar year following displacement, while it is between 13 and 20 percent in relative terms in Germany.

## CONCLUSION

In conclusion, the labor markets of France and Germany, although different along certain dimensions, seem to provide roughly similar outcomes for displaced workers. One reason for these similarities may be similar institutional regulations, like employment protection offered by labor law. Our analysis is purely descriptive and we have not attempted to attribute findings, and differences from the North American literature, to differences in institutional regulations. This is a promising avenue for future research.

## Notes

1. See, for example, Bonnal and Fougère (1993, 1996) for France, and Hunt (1995) for Germany.
2. Note that our age selection criteria are designed to eliminate retirement as a destination after separation from one's employer.
3. See Fallick (1996) for a survey.

4. French labor law distinguishes between layoffs for economic reasons and layoffs for personal reasons, such as inadequate performance or misconduct.
5. There are special considerations for large companies that lay off at least 10 people over a 3-month period without passing the 10-people-in-30-day limit, but these will not be treated here.
6. The links between the unemployment benefits schedules and eligibility requirements are quite complicated. What is presented here is a short synopsis of the important points of the unemployment insurance law prior to the substantial reforms that took place in 1996.
7. A worker can qualify by satisfying any one of these criteria: a) 122 days or 676 hours of work over the 8 months preceding the end of the labor contract; b) 192 days or 1,014 hours of work over the 12 months preceding the end of the labor contract; c) 243 days or 1,352 hours of work over the 12 months preceding the end of the labor contract; d) 426 days or 2,366 hours of work over the 24 months preceding the end of the labor contract; or 821 days or 4,563 hours of work over the 36 months preceding the end of the labor contract. The end of the labor contract is defined as the last day of the notice period, regardless of whether this was bought off or not. Workers who become unemployed due to the closure of their plant are not required to satisfy criterion "a." The levels and duration of benefits vary according to the criterion satisfied, with the most difficult criterion, "e," providing the highest benefits. Criterion "e" entitles the worker to higher and longer benefits than "b."
8. Note that the eligibility rules for unemployment insurance give the worker the incentive to declare all separations as involuntary, while the administrative procedures described above give the firm the incentive to declare separations as voluntary. This conflict of interest often introduces a bargaining situation in the case where the employer intends to lay off a small number of workers. The firm can make side payments to the worker such that the worker declares the separation as voluntary (if asked) and does not apply for unemployment benefits. Anecdotal evidence suggests that this is a relatively frequent phenomenon.
9. Note that, upon expiration of unemployment benefits, individuals may be eligible for the Minimum Insertion Allowance (Revenu minimum d'insertion, or RMI). The RMI is a means-tested income support that has conditions and levels not directly linked to unemployment duration, previous wages, or labor market histories.
10. See Margolis (1993) for a detailed discussion of the institutional context surrounding contract extension in France, as well as an analysis of the implications of contract extension for wage setting and firm participation in employers' associations.
11. See Bughin (1985).
12. The inflation threshold was removed in 1970 with the reform that converted the SMIG into the SMIC.
13. For a detailed analysis of the minimum wage in France, see Abowd, Kramarz, Margolis, and Philippon (2000).

14. It has been complemented by the *Arbeitsschutzbereinigungsgesetz* (1969), the *Betriebsverfassungsgesetz* (1972), and the *Gesetz zur Änderung des KSchG* (1978), among others.
15. The differential treatment of blue- and white-collar workers was abolished in October 1993. We report here the regulations that were in force up to 1993, since our data covers the period up to 1990.
16. If an unemployed person fulfills the above criteria, the minimum period of eligibility is 156 days. Depending on the duration of contribution payments and the age of the applicant, this period can be extended to up to 832 days (see Kittner 1995, p. 192, for details).
17. An exhaustive DADS data set file does exist for use primarily by the tax authorities, but we were only given access to the 1/25 sample.
18. Note that these data include self-employed workers who pay themselves salaries. Self-employed workers who act as pure residual claimants will not be included. Unfortunately, the data do not allow us to separate self-employed wage earners from other wage earners.
19. Our earnings data are available as 8-byte numeric variables and are subject to neither top nor bottom coding. All labor earnings are reported.
20. See Abowd, Finer, Kramarz, and Roux (1997) for details. Given that our analysis sample begins in 1984 and that we consider seniority as a categorical variable for which the largest category is more than 10 years, our results are robust to most estimation error in the job start date due to the imputation for the left-censored spells.
21. For individuals for whom EDP data are not available, we use a multinomial logit to impute the probability that the individual had each of the educational degrees possible. See the data appendix of Abowd, Kramarz, Margolis, and Philippon (1999) for more details.
22. From 1988–1992 (1990 excluded), INSEE introduced two variables distinguishing whether the observation corresponded to a plant that had ceased to exist as an “economic” or “administrative” entity. The main difference between these variables is that firms occasionally continue to exist “administratively,” but with zero workers, after their “economic” death. The manner by which mergers and acquisitions affect the plant identifier in our data is rather involved. Unfortunately, these data have serious inconsistencies, as individuals whose observations correspond to the economic or administrative death of their plant in the year  $t$  are just as likely to still be employed by the plant, and receiving a salary, in the year  $t + 1$  as they are to have separated from the plant. Thus we do not consider these variables informative for the analysis of worker displacements.
23. Our approach to defining displacements is based on a combination of firm account data and payroll data. An alternative approach, such as considering separations that occur simultaneously with large reductions in firm employment as displacements (see Jacobson, LaLonde, and Sullivan 1993), is not feasible with our data, as firm employment is not available for all employees at all dates.

24. The SUSE data used here are a sample of enterprises in France with differential sampling probabilities based on reporting requirements which vary with employment (the largest firms appear with probability 1). Depending on the size of the firm and the type of accounts it sends to the relevant regulating and tax authorities, information may be available on a detailed balance sheet, income statement, and flow-of-funds statement. The smaller enterprises are not required to provide as much detailed information. Here we use the presence of *any* information on the firm as a sign of its continued existence. Therefore, we do not lose firms when they pass below the threshold for providing detailed accounts.
25. For separations in years prior to 1996, the firm clearly continues to exist, as workers employed by it are observed. For 1996, we are unable to determine whether the firm will disappear in 1997. These observations could theoretically be considered displacements, but given our eventual sample selection restrictions (see below), the question of how to classify these observations is moot.
26. The requirement that there be at least three observed employees means that, in expectation, the corresponding firm has at least 75 employees. It prevents us from arbitrarily classifying all departures from small firms as false firm deaths. On the other hand, it may cause us to miss all false firm deaths among the smallest firms in our sample. Unfortunately, given that we only have access to the 1/25 sample of employment, we cannot improve upon the treatment for small firms beyond the SUSE sampling scheme. SUSE data are available from financial reports that are mandatory for firms with total sales of at least 500,000 F per year (or at least 150,000 F per year for firms in service industries) and are optional for all others.
27. We are grateful to Peter Kuhn for suggesting this algorithm.
28. We consider the year preceding the year of firm death since, with SUSE data at least, we do not know the precise date within the year at which the firm ceased operations. Furthermore, a firm whose fiscal year ends after June 30 of the year  $t + 1$  will have year  $t + 1$  SUSE information, even if operations ceased in year  $t$ .
29. Results based on the more strict definition of displacement, considering only those separations occurring within one year of firm disappearance, are available upon request. A table indicative of the importance of the definitional differences can be found in Appendix B.
30. There exist other data sources that allow us to identify layoffs at the plant level and to classify them by type (economic or personal reasons). However, these data do not allow us to tell *which* workers are among those laid off, and they are subject to an even more restrictive sampling scheme than the SUSE data. One possible avenue for future research might assign a probability that a separation corresponds to a layoff for economic reasons, as opposed to relying on a simple indicator variable to denote that reason for each separation.
31. Margolis (1999) and Margolis (2000) treat both men and women.
32. Because of the complex interplay between youth employment-promotion schemes (for which eligibility ends at 25 years of age) and the minimum wage in France (see Abowd, Kramarz, Lemieux, and Margolis 2000), we begin considering individuals after they become 26 years old.



33. Note that this does not mean that there will be no workers with seniority of less than four years in our data. In particular, for the earnings-change models, we use postseparation information during which workers who have experienced a separation will typically have less than four years of seniority.
34. This latter constraint eliminates 15.2 percent of the individuals from the DADS and 16.7 percent of the individual-year combinations that satisfy our eligibility criterion (26- to 50-year-old men with at least four years of seniority in some job in 1984). In particular, 32.7 percent of the yearly observations corresponding to workers whose first separation was a displacement, and 28.6 percent of the yearly observations of workers whose first separation was for other reasons, are eliminated due to the restriction against simultaneous job holding. This may bias our results. Similar models that allow for simultaneous job holding are estimated in Margolis (1999, 2000).
35. Note that the entire, nonselected sample was used in the determination of firm "death" dates.
36. In order to give a more accurate picture of the incidence of worker displacement, we consider all separations in our sample. Considering only first separations would severely underestimate the incidence of worker displacement in the later years of our sample.
37. The duration analyses are based on data with one observation per individual, corresponding to the first separation observed in our sample window.
38. As our data do not allow us to measure revenues from non-labor-market sources, our earnings measure is available only for years in which labor market earnings are strictly positive.
39. It should be noted, however, that using such a measure can obscure the role of part-time employment on earnings (Farber 1999). Margolis (1999) shows how conclusions concerning earnings movements are sensitive to the earnings measure, in particular by comparing  $\log(\text{annual earnings})$  with  $\log(\text{daily earnings})$  measures.
40. Accordingly, the sample is left-truncated and right-censored. The truncation refers to the lowest level of earnings for which social security contributions are obligatory; the right-censoring refers to the highest level of earnings subject to contributions.
41. While we observe separations of workers at the exact date of occurrence, information on plant size is measured at a fixed date each year. Plant size refers to employment in June of the relevant year. Accordingly, the time of closure cannot be exactly dated.
42. Recall that we are looking only at permanent separations in this chapter and that individuals who spend less than a full calendar year on temporary layoff are not therefore considered as separators.
43. The discussion that follows supposes that the separations attributed to 1989 were more or less evenly distributed between 1989 and 1990.

44. Recall that we are using separations in the two calendar years preceding the calendar year in which the firm identified disappears as our criterion for distinguishing displacements from other separations.
45. Women in France are guaranteed eight weeks of maternity leave by law, of which two are indented to be taken before childbirth and six after. However, collective agreements often extend the durations of available maternity leave, sometimes to 16 weeks or more. Furthermore, the employment relation is not interrupted because of maternity leave, and the woman is guaranteed a comparable position to the one she left upon returning from maternity leave.
46. These results concerning incidence of displacement are comparable to the studies cited by Fallick (1996), who noted that job seniority was negatively related to the incidence of displacement in the United States.
47. The fact that the share of displacements in total separations is lower for 50- to 55-year-olds than for 35- to 40-year-olds suggests that the phenomenon generating the additional separations is not necessarily linked to firm closure.
48. Appendix G presents the results of a similar estimation, but there the reference group is only those workers who remain continuously employed with the same employer throughout the 1984–1989 sample window.
49. Our distinction between displaced and separated workers refers to the reason for the first separation after being in continuous employment between 1980 and 1984.
50. Recall that separation status refers to the first separation only.
51. In France, we treat all spells that do not end before December 31, 1989, as censored.
52. Informal discussions with ASSEDIC administrators suggest that, in 1998 at least, approximately one-third of individuals drawing unemployment insurance exhausted their benefits. These figures are roughly consistent with the survivor function measured a decade earlier and shown in Figure 5.1.
53. The estimated Kaplan-Meier hazards underlying Figure 5.1 are roughly linear and decreasing in the log of the hazard rate, which suggests that a Weibull-distributed baseline hazard is the most appropriate parametric specification. Semiparametric (Cox) models were not estimable under the material constraints (memory allocation and CPU time) imposed by INSEE.
54. Note that, since the parameter estimates refer to the proportionality factor in the hazard function, a positive coefficient means that higher levels of the corresponding variable are associated with higher values of the hazard function and thus shorter expected non-employment durations.
55. Benefit payments are proportional to the most recent earnings prior to separation.
56. Jacobson, LaLonde, and Sullivan (1993), on the other hand, supposed that workers not in employment after separation had zero earnings and kept these workers in the sample for the calculation of their average earnings changes.
57. Note that the earnings change for other separators combines individuals who left their jobs for better outside offers with workers who were fired for cause and workers who were laid off from firms that did not shut down within the following two calendar years.

58. One might ask why displaced workers did not leave earlier if they were going to have such large earnings gains associated with changing employers. There are several possible explanations. First, the employment-protection legislation provided them with job security with their previous employer that they stood to lose if they changed earlier. The prospect of imminent firm closure reduced the value of this nonwage component of job-specific utility, however, thus making outside offers relatively more attractive. A second possible explanation is that the offer arrival rate for on-the-job search may be lower than that for off-the-job search (or search during the notice period). In this case, workers whose first separation was a displacement may simply not have received another offer prior to their separation. A third explanation is that 1988 was a good year for the French economy, with 3.95 percent GDP growth, relative to an average of 1.51 percent over the 1984–1987 period (BLS Macroeconomic Statistics, <http://stats.bls.gov/fls-data.htm>). As such, there may have been better outside offers in 1988 than in earlier years. Finally, since postdisplacement wages are only measured for reemployed workers, the sample of workers contributing to the 1986 and 1988 averages are not the same. In particular, the set of workers employed in 1988 may not be representative of all workers displaced in 1987.
59. Our estimation strategy resembles that of Jacobson, LaLonde, and Sullivan (1993).
60. For France, the reference year is five years prior to separation. For Germany (see Table 5.13), it is the year immediately preceding separation.
61. See Margolis (1999) for estimates of this model using  $\log(\text{total annual earnings})$  as the dependent variable. Margolis (2000) estimated a similar model but with individual fixed effects.
62. Note that, for a given coefficient  $\beta$  on a regressor  $x$  in Tables 5.12–5.14,  $\log(y) = \beta x$ . To calculate the *percentage* change in  $y$  induced by  $x$ , i.e.,  $(y_{t+1} - y_t)/y_t$ , one typically makes use of the approximation  $\log(1 + x) = x$ . This approximation is not valid when  $x$  is far from zero, and thus the coefficients are not directly interpretable as percentage changes in the dependent variable. For this reason, we have used the exact formula, i.e.,  $(y_{t+1} - y_t)/y_t = \exp(\beta) - 1$ , in the discussion of these tables.
63. See Margolis (1999) for further analyses in this direction.
64. Abowd et al. (1999) show that the firm-specific component of earnings is negatively related to the probability of firm survival on the same DADS and SUSE data, but the estimates are relatively imprecise.
65. See Margolis (1996) for a detailed analysis of returns to seniority in France.
66. Margolis (2000) estimated a similar specification with individual fixed effects on a data set that does not eliminate individuals with simultaneous job holding and found that the size of the postseparation decline in average daily earnings was reduced, but not eliminated. One alternative strategy, as used by Jacobson, LaLonde, and Sullivan (1993), might be to include all workers in the postseparation period, but to attribute zero earnings to workers who have yet to find jobs.

67. A word of warning is necessary when comparing our results for incidence. The figures for France refer to the number of individuals who experience a type of separation per year, while the numbers for Germany refer to the number of individuals whose first separation in a seven-year period is of a given type. Thus, the figures are not directly comparable; nevertheless, we attempt to draw some conclusions below.
68. Given that the Displaced Worker Supplements are survey based, they may be subject to measurement error as a result of individuals misreporting firings for cause as layoffs.
69. As a comparison, Swaim and Podgursky (1991) found that the rate of exit from non-employment among displaced workers decreased with seniority in the United States.

**Table 5.1 Incidence of Permanent Separations of Long-Tenure Workers by Year in France**

Year <sup>a</sup>	Total observations	Total separations	Total displacements	Other separations	Separations in total (%)	Displaced in total (%)
<b>Men</b>						
1984	99,479	8,309	2,821	5,584	8.35	2.84
1985	95,842	8,620	3,487	5,244	8.99	3.64
1986	93,009	8,730	3,365	5,478	9.39	3.62
1987	91,458	10,517	3,633	7,000	11.63	4.02
1988	86,479	8,439	3,557	5,006	9.73	4.10
1989	85,317	15,459	6,349	9,380	18.12	7.44
Σ	550,854	60,074	23,212	37,649	10.91	4.21
<b>Women</b>						
1984	57,595	5,274	2,142	3,172	9.16	3.72
1985	54,588	5,113	2,044	3,119	9.37	3.74
1986	52,267	5,275	2,245	3,069	10.09	4.30
1987	50,226	5,094	1,895	3,242	10.14	3.77
1988	48,699	4,790	1,888	2,961	9.84	3.88
1989	47,465	8,184	3,301	5,010	17.24	6.95
Σ	310,840	33,730	13,515	20,573	10.85	4.35

NOTE: Long tenure = four or more years.

<sup>a</sup> Multiple observations in the same year are aggregated to the unique individual-year level.

SOURCE: Authors' calculations from DADS data.

**Table 5.2 Incidence of Permanent Separation by Previous Seniority and Age in France in 1984**

Group (years)	Total observations	Total separations <sup>a</sup>	Total displacements	Other separations	Separations in total (%)	Displaced in total (%)	Displaced in separations (%)
4 ≤ Seniority < 6	19,920	2,488	728	1,760	12.49	3.65	29.26
6 ≤ Seniority < 8	24,026	2,235	753	1,482	9.30	3.13	33.69
8 ≤ Seniority < 10	2,791	259	124	135	9.28	4.44	47.88
≤ 10 Seniority	52,742	3,327	1,163	2,164	6.31	2.21	34.96
Σ	99,479	8,309	2,768	5,541	8.35	2.78	33.31
25 ≤ Age < 30	11,963	1,135	406	729	9.49	3.39	35.77
30 ≤ Age < 35	26,154	2,267	765	1,502	8.67	2.92	33.75
35 ≤ Age < 40	19,431	1,553	539	1,014	7.99	2.77	34.71
40 ≤ Age < 45	20,400	1,560	528	1,032	7.65	2.59	33.85
45 ≤ Age < 50	14,322	1,112	351	761	7.76	2.45	31.56
50 ≤ Age < 55	7,209	682	232	450	9.46	3.22	34.02
Σ	99,479	8,309	2,821	5,488	8.35	2.84	33.95

NOTE: Multiple observations in the same year are aggregated to the unique individual-year level. Numbers refer to the 1984 data year.

<sup>a</sup> Of these individuals, 96 experienced both displacements and other separations in 1984. Only the first separation is counted in the displacements and other separations columns in the top half of the table, as the second separations are (by design) from low-seniority jobs.

SOURCE: Authors' calculations from DADS data.

**Table 5.3 Probit Models of Incidence of Separation, Total and by Type of Separation Relative to All Alternative States for France in 1984**

Variable	Displacements		Other separations		All separations	
Age	-0.0048	(0.0136)	-0.0077	(0.0108)	-0.0065	(0.0096)
Age <sup>2</sup> /100	0.0081	(0.0177)	0.0146	(0.0139)	0.0126	(0.0124)
4 ≤ Seniority < 6	0.1400***	(0.0224)	0.3563***	(0.0178)	0.3236***	(0.0155)
6 ≤ Seniority < 8	0.1016***	(0.0215)	0.1849***	(0.0170)	0.1784***	(0.0150)
8 ≤ Seniority < 10	0.1378***	(0.0463)	0.0194	(0.0436)	0.0884**	(0.0362)
Elementary school	-0.0895	(0.0689)	-0.0047	(0.0550)	-0.0326	(0.0487)
Junior high school	0.0918	(0.1020)	0.0185	(0.0852)	0.0584	(0.0743)
High school	0.1011	(0.1262)	0.1022	(0.1013)	0.0783	(0.0912)
Basic vocational school	-0.0748	(0.0658)	-0.1150**	(0.0541)	-0.1113**	(0.0474)
Advanced vocational school	-0.2412**	(0.1184)	-0.0812	(0.0846)	-0.1472*	(0.0767)
Undergraduate	0.1072	(0.1185)	0.1829**	(0.0911)	0.1787**	(0.0821)
Graduate school and grande école	-0.0696	(0.1114)	0.3318***	(0.0772)	0.2452***	(0.0711)
Constant	-2.2219***	(0.2755)	-1.6680***	(0.2144)	-1.5684***	(0.1911)
No. of obs.	99,479		99,479		99,479	
Log likelihood	-12,251		-20,886		-27,552	

NOTE: Standard errors are in parentheses. Estimates include data from 1984 only, aggregated to one observation per individual. All models also include controls for previous seniority, sector (15 categories) and skill level (3 categories). Reference groups: No educational certification and 10 or more years of seniority. Models estimate probability of specified type of separation relative to all alternative situations. \*\*\* = Statistically significant at the 1% level; \*\* = statistically significant at the 5% level; \* = statistically significant at the 10% level.

**Table 5.4 Breakdown of Separations by Type and Seniority for Germany**

Variable	Continuously employed	Total	Other separations	Displacements	Displaced (%)	
					In separations	In total
$4 \leq \text{Seniority} < 6$	5,246	4,285	3,596	689	16.07	7.23
$6 \leq \text{Seniority} < 8$	4,505	3,009	2,395	614	20.40	8.17
$8 \leq \text{Seniority} < 10$	8,539	4,913	3,806	1,107	22.53	8.23
$10 \leq \text{Seniority}$	14,304	3,999	3,136	863	21.58	4.72
$\Sigma$	32,594	16,206	12,933	3,273	20.19	6.71
$25 \leq \text{Age} < 30$	4,066	2,686	2,214	472	17.57	6.99
$30 \leq \text{Age} < 40$	10,746	5,921	4,795	1,126	19.01	6.76
$40 \leq \text{Age} < 50$	14,830	6,243	4,870	1,373	21.99	6.52
$50 \leq \text{Age}$	2,952	1,356	1,054	302	22.27	7.01
$\Sigma$	32,594	16,206	12,933	3,273	20.19	6.71

NOTE: Seniority and age refer to 1984.

SOURCE: Authors' calculations from IAB data.



**Table 5.5 Probability of Displacement or Separation between 1984 and 1990 in Germany—Marginal Effects**

Variable	Displacements		Other separations	
Age/100	0.005	(0.020)	-0.238***	(0.030)
5 ≤ Seniority <7	0.003	(0.004)	-0.039***	(0.006)
7 ≤ Seniority <9	-0.014***	(0.003)	-0.088***	(0.005)
9 ≤ Seniority	-0.035***	(0.003)	-0.153***	(0.005)
Apprentice, no high school	0.008***	(0.003)	-0.006	(0.005)
No apprentice, high school	-0.023	(0.019)	0.052	(0.032)
Apprentice, high school	0.016	(0.015)	0.046**	(0.020)
Polytechnic	-0.028***	(0.007)	0.061***	(0.012)
University	-0.018**	(0.009)	0.141***	(0.014)
Education unknown	0.026***	(0.008)	0.053***	(0.011)
<b>Sector</b>				
2: Energy	-0.085***	(0.001)	-0.189	(0.014)
3: Mining	-0.062***	(0.005)	0.119***	(0.031)
4: Manufacturing	-0.146	(0.012)	-0.092***	(0.022)
5: Construction	-0.038***	(0.007)	-0.001	(0.023)
6: Distributional services	-0.063***	(0.006)	-0.004	(0.023)
7: Industry services	-0.078***	(0.003)	-0.055**	(0.021)
8: Consumer services	-0.069***	(0.003)	-0.081***	(0.024)
9: Public services	-0.101***	(0.003)	-0.112***	(0.019)
No. of obs.	36,689		44,402	
Probability	0.086		0.244	

NOTE: Standard errors are in parentheses. All estimations refer to 1983. Excluded categories: agricultural sector, no apprenticeship, no high school and 3 ≤ seniority <5.

Comparison group: continuously employed in same plant, 1984–1990. \*\*\* = Statistically significant at the 1% level; \*\* = statistically significant at the 5% level.

SOURCE: Authors' calculations from IAB data.

**Table 5.6 Non-Employment Spells after First Separation by Seniority in France**

Seniority level	All separations <sup>a</sup>		Displacements <sup>b</sup>		Other separations <sup>c</sup>	
	Number	Non-empl. spell (%) <sup>d</sup>	Number	Non-empl. spell (%) <sup>e</sup>	Number	Non-empl. spell (%) <sup>f</sup>
4 ≤ Seniority < 6	1,699	85.40	437	79.63	1,262	87.40
6 ≤ Seniority < 8	2,912	84.38	802	81.92	2,110	85.31
8 ≤ Seniority < 10	2,685	83.99	762	82.94	1,923	84.40
10 ≤ Seniority	8,998	79.06	2,406	74.44	6,592	80.75
Σ	16,294	81.48	4,407	77.79	11,887	82.86

NOTE: Statistics include only first separations and impose the retirement constraint (see text).

<sup>a</sup> Total number of separations, by seniority.

<sup>b</sup> Number of displacements.

<sup>c</sup> Number of other separations.

<sup>d</sup> Percentage of non-employment spells in total.

<sup>e</sup> Percentage of displacements that are followed by a positive-duration non-employment spell.

<sup>f</sup> Percentage of other separations that are followed by a positive-duration non-employment spell.

SOURCE: Authors' calculations from DADS data.

**Table 5.7 Weibull Proportional Hazard Models for Return to Work for France**

Variable	All separations		Separated for unknown reason		Displaced	
Constant	-1.4272***	(0.2757)	-1.5000***	(0.3018)	0.3903	(205.6546)
6 ≤ Seniority < 8	-0.4538***	(0.1306)	-0.4079***	(0.1429)	-0.5210***	(0.1772)
8 ≤ Seniority < 10	-0.4928***	(0.1389)	-0.4261***	(0.1528)	-0.5817***	(0.1858)
10 ≤ Seniority	-0.4807***	(0.1276)	-0.4106***	(0.1398)	-0.5827***	(0.1719)
Firm closure	0.2081**	(0.1049)	n.a. <sup>a</sup>	—	n.a.	—
Age	0.0080	(0.0286)	0.0064	(0.0317)	0.0102	(0.0382)
Elementary school	0.2461	(0.2101)	0.3020	(0.2333)	0.1395	(0.2776)
Junior high school	0.2906	(0.2570)	0.4343	(0.2743)	-0.0313	(0.3860)
High school	0.6020**	(0.2685)	0.6739**	(0.2967)	0.5216	(0.3601)
Basic vocational school	0.3829*	(0.2042)	0.5054**	(0.2287)	0.1283	(0.2670)
Advanced vocational school	0.4219*	(0.2530)	0.5048*	(0.2708)	0.2810	(0.3744)
Undergraduate	1.0114***	(0.2611)	1.4623***	(0.2940)	0.1666	(0.3535)
Graduate school and grande école	0.6371***	(0.2459)	0.6628**	(0.2679)	0.5379	(0.3411)
1985	-0.0187	(0.1192)	-0.0825	(0.1307)	0.1043	(0.1633)
1986	0.1601	(0.1267)	0.0811	(0.1381)	0.3163*	(0.1746)
1987	0.2202*	(0.1302)	0.1505	(0.1422)	0.3519**	(0.1782)
1988	0.1938	(0.1395)	0.1367	(0.1529)	0.2986	(0.1897)

1989	0.2968**	(0.1462)	0.1606	(0.1613)	0.5577***	(0.1984)
Weibull shape parameter	0.4335		0.4311		0.4464	
No. of obs.	13,838		10,136		3,702	
No. of failures	8,350		5,698		2,652	
Log likelihood	-25,938		-18,134		-7,701	

NOTE: Standard errors are in parentheses. Right censoring occurs when the individual is not reemployed by December 31, 1989. All models include controls for sector of pre-separation firm (15 categories) and skill level (3 categories). Reference groups: 1984, 4–6 years of seniority, and no educational certification. \*\*\* = Statistically significant at the 1% level; \*\* = statistically significant at the 5% level; \* = statistically significant at the 10% level.

<sup>a</sup> n.a. = not applicable.

SOURCE: Authors' calculations from DADS data.

**Table 5.8 Non-Employment Spells after Separation by Seniority in Germany**

Seniority level	All separations <sup>a</sup>		Displacements <sup>b</sup>		Other separations <sup>c</sup>	
	Number	Non-empl. spell (%) <sup>d</sup>	Number	Non-empl. spell (%) <sup>e</sup>	Number	Non-empl. spell (%) <sup>f</sup>
4 ≤ Seniority < 6	1,749	54.94	281	51.60	1,468	55.58
6 ≤ Seniority < 8	2,422	50.28	458	46.28	1,964	51.22
8 ≤ Seniority < 10	3,977	52.07	863	44.38	3,114	54.30
10 ≤ Seniority	8,043	46.15	16,721	33.01	6,371	49.59
Σ	16,191	49.16	3,274	39.46	12,917	51.62

<sup>a</sup> Total number of separations, by seniority.

<sup>b</sup> Number of displacements.

<sup>c</sup> Number of separations.

<sup>d</sup> Percentage of non-employment spells in total.

<sup>e</sup> Percentage of displacements that are followed by positive-duration non-employment spells.

<sup>f</sup> Percentage of separations that are followed by positive-duration non-employment spells.

SOURCE: Authors' calculations from IAB data.

**Table 5.9 Cox Models for Return to Work for Germany**

Variable	All separations		Separated for unknown reason		Displaced	
Age/100	-3.1258***	(0.2257)	-3.5590***	(0.2599)	-1.8075***	(0.4644)
6 ≤ Seniority < 8	0.0310	(0.0571)	0.0293	(0.0641)	0.0801	(0.1286)
8 ≤ Seniority < 10	0.0641	(0.0532)	0.0340	(0.0602)	0.2053*	(0.1178)
10 ≤ Seniority	-0.0217	(0.0617)	-0.1062	(0.0703)	0.2880**	(0.1324)
Closure	0.4035***	(0.0388)	n.a. <sup>a</sup>	—	n.a.	—
Apprentice, no high school	0.3749***	(0.0407)	0.4084***	(0.046)	0.2669***	(0.0826)
No apprentice, high school	0.1485	(0.3041)	0.1886	(0.3367)	-0.0092	(0.7159)
Apprentice, high school	0.0099	(0.1709)	0.3215	(0.1936)	-0.6717*	(0.3636)
Polytechnic	0.1972	(0.1309)	0.3311**	(0.1421)	-0.2354	(0.3427)
University	0.0879	(0.1276)	0.1994	(0.1302)	-1.8720*	(1.0043)
Education unknown	0.0524	(0.0721)	0.0764	(0.0842)	-0.0361	(0.1404)
1985	0.1230***	(0.0486)	0.1528***	(0.0565)	0.0886	(0.0967)
1986	0.2224***	(0.0549)	0.2278***	(0.0629)	0.2249**	(0.1143)
1987	0.1694***	(0.0621)	0.2408***	(0.0709)	-0.0342	(0.1305)
1988	0.1709***	(0.0696)	0.2146***	(0.0796)	0.0635	(0.1438)
1989	0.1533**	(0.0784)	0.2347***	(0.0884)	-0.0739	(0.1734)
1990	-0.0167	(0.1027)	-0.0879	(0.1171)	0.6807**	(0.2101)

(continued)

**Table 5.9 (continued)**

Variable	All separations	Separated for unknown reason	Displaced
No. of obs.	5,019	3,998	1,021
No. of failures	3,720	2,813	907
Log likelihood	-28,924	-21,269	-5,558

NOTE: Standard errors are in parentheses. Right censoring occurs when the individual is not reemployed by December 1990. Reference group: no apprenticeship, no high school. \*\*\* = Statistically significant at the 1% level; \*\* = statistically significant at the 5% level; \* = statistically significant at the 10% level.

<sup>a</sup> n.a. = not applicable.

SOURCE: Authors' calculations from IAB data.

**Table 5.10 Two-Period Earnings Growth by Seniority at Date of First Separation in France**

Group	Continuously employed		All displaced		Slow displaced <sup>a</sup>		Other separations		Slow other separations <sup>a</sup>	
	% $\Delta w$	Obs.	% $\Delta w$	Obs.	% $\Delta w$	Obs.	% $\Delta w$	Obs.	% $\Delta w$	Obs.
4 ≤ Seniority < 6	4.70	13,712	16.62	825	-9.34	175	10.43	1,521	-12.02	349
6 ≤ Seniority < 8	4.38	35,453	12.22	1,642	1.48	213	8.91	2,180	-25.92	531
8 ≤ Seniority < 10	3.55	31,659	13.51	1,375	-3.67	154	10.05	1,464	-11.04	238
10 ≤ Seniority	2.58	138,298	9.87	4,708	-6.07	441	3.37	4,194	-23.56	556
Σ	3.15	219,122	11.88	8,550	-4.64	983	6.85	9,359	-20.12	1,674

NOTE: Data correspond to one observation per individual per year.

<sup>a</sup> “Slow” refers to individuals who were not reemployed in the calendar year following the separation.

SOURCE: Authors’ calculations from DADS data.



**Table 5.11 Two-Period Log Earnings Growth, by Seniority at Date of First Separation for Germany**

Seniority \ Group	Displaced		Displaced I <sup>a</sup>		Displaced II <sup>b</sup>		Separated		Separated I <sup>c</sup>		Cont. employed	
	% $\Delta w$	No. obs.	% $\Delta w$	No. obs.	% $\Delta w$	No. obs.	% $\Delta w$	No. obs.	% $\Delta w$	No. obs.	% $\Delta w$	No. obs.
4 ≤ Seniority < 6	2.44	242	-20.43	15	0.83	89	4.58	1,048	-8.21	102	3.50	12,603
6 ≤ Seniority < 8	5.74	397	7.04	22	2.60	111	4.31	1,422	-12.72	107	3.98	22,305
8 ≤ Seniority < 10	1.93	737	-3.42	41	-2.10	190	2.94	1,979	-13.07	135	4.82	50,482
10 ≤ Seniority	2.36	1,288	-15.45	34	-3.57	254	2.46	3,273	-23.66	113	3.14	167,374
Σ	2.75	2,665	-7.29	112	-1.46	644	3.21	7,730	-14.24	458	4.64	255,331

<sup>a</sup> Workers who have not found a job in the year after displacement.

<sup>b</sup> Workers who experience a non-employment spell of at least one week after displacement.

SOURCE: Authors' calculations.

**Table 5.12 Log Average Real Daily Earnings Regressions for France**

Variable	Displacements		Other separations	
Separated <sup>a</sup>	-0.0917***	(0.0068)	-0.0553***	(0.0060)
Sep-4 <sup>b</sup>	-0.0042	(0.0084)	-0.0035	(0.0075)
Sep-3	-0.0121	(0.0080)	-0.0230***	(0.0069)
Sep-2	-0.0124	(0.0077)	-0.0256***	(0.0067)
Sep-1	-0.0281***	(0.0075)	-0.0520***	(0.0066)
Perm <sup>c</sup>	-0.0479***	(0.0109)	-0.1061***	(0.0069)
Sep1	0.1265***	(0.0080)	0.1349***	(0.0073)
Sep2	0.0377***	(0.0082)	0.0255***	(0.0075)
Sep3	0.0196**	(0.0086)	-0.0137*	(0.0077)
Sep4	-0.0049	(0.0094)	-0.0187**	(0.0083)
Sep5	-0.0250**	(0.0115)	-0.0162*	(0.0098)
Age	0.0465***	(0.0010)	0.0472***	(0.0010)
Age <sup>2</sup> /100	-0.0440***	(0.0012)	-0.0448***	(0.0012)
1985	-0.0004	(0.0022)	-0.0006	(0.0022)
1986	0.0081***	(0.0022)	0.0106***	(0.0022)
1987	-0.0081***	(0.0022)	-0.0050**	(0.0023)
1988	-0.0045*	(0.0023)	-0.0044*	(0.0023)
1989	0.0016	(0.0023)	-0.0025	(0.0024)
Elementary school	0.0553***	(0.0053)	0.0439***	(0.0055)
Junior high school	0.2207***	(0.0080)	0.2151***	(0.0082)
High school	0.3447***	(0.0096)	0.3533***	(0.0100)
Basic vocational school	0.1357***	(0.0051)	0.1180***	(0.0053)
Advanced vocational school	0.2807***	(0.0075)	0.2677***	(0.0077)
Undergraduate	0.4108***	(0.0092)	0.4018***	(0.0093)
Graduate school and grande école	1.0866***	(0.0081)	1.0687***	(0.0081)
Constant	-2.8427***	(0.0205)	-2.8827***	(0.0210)

(continued)

**Table 5.12 (continued)**

Variable	Displacements	Other separations
No. of obs.	402,174	433,627
$R^2$	0.3608	0.3339

NOTE: Standard errors are in parentheses. Reference groups = 1984 and no educational certification. \*\*\* = Statistically significant at the 1% level; \*\* = statistically significant at the 5% level; \* = statistically significant at the 10% level.

<sup>a</sup> Separated = 1 for all observations corresponding to individuals who separate at some point between 1984 and 1989.

<sup>b</sup> The Sep<sub>*i*</sub> variables equal 1 in the *i*th year before or after separation.

<sup>c</sup> Perm = 1 for observations after separation if time between the two jobs exceeded one year.

SOURCE: Authors' calculations from DADS data.

**Table 5.13 Earnings Regressions for Censored Regression Models for Germany: Displaced Workers Only**

Variable	All		Non-employment spell <sup>a</sup>	
Sep <sub>-6</sub> <sup>b</sup>	-0.0029	(0.0222)	-0.0403	(0.0691)
Sep <sub>-5</sub>	0.0023	(0.0142)	-0.0586	(0.0390)
Sep <sub>-4</sub>	0.0275***	(0.0113)	0.0231	(0.0282)
Sep <sub>-3</sub>	0.0156	(0.0098)	0.0217	(0.0227)
Sep <sub>-2</sub>	0.0062	(0.0088)	0.0052	(0.0196)
Perm <sup>c</sup>	-0.2159***	(0.0170)	-0.1310***	(0.0191)
Sep <sub>1</sub>	-0.0161**	(0.0080)	-0.0414***	(0.0176)
Sep <sub>2</sub>	-0.0222***	(0.0086)	-0.0207	(0.0190)
Sep <sub>3</sub>	-0.0246***	(0.0093)	-0.0015	(0.0207)
Sep <sub>4</sub>	-0.0121	(0.0103)	0.0280	(0.0225)
Sep <sub>5</sub>	-0.0103	(0.0118)	0.0415*	(0.0250)
Sep <sub>6</sub>	-0.0280	(0.0156)	0.0411	(0.0317)
Age	6.2292***	(0.3114)	5.4975***	(0.6326)
Age <sup>2</sup> /100	-6.9903***	(0.3771)	-6.3207***	(0.7638)
1985	0.0002	(0.0086)	-0.0097	(0.0185)
1986	0.0355***	(0.0090)	0.0308	(0.0196)
1987	0.0733***	(0.0095)	0.0561***	(0.0209)
1988	0.1045***	(0.0100)	0.0654***	(0.0223)
1989	0.1140***	(0.0106)	0.0560***	(0.0234)
1990	0.1165***	(0.0113)	0.0647***	(0.0251)
Apprentice, no high school	0.1892***	(0.0056)	0.1722***	(0.0108)
No apprentice, high school	0.4315	—	0.3151***	(0.1262)
Apprentice, high school	0.3751***	(0.0222)	0.1775***	(0.0512)
Polytechnic	0.6356***	(0.0194)	0.4961***	(0.0611)
University	0.6990***	(0.0231)	0.7647***	(0.0813)
Education unknown	0.0893***	(0.0095)	0.0602***	(0.0183)
Constant	2.8313***	(0.0630)	2.9633***	(0.1275)

(continued)

**Table 5.13 (continued)**

Variable	All	Non-employment spell <sup>a</sup>
No. of obs.	19,018	4,995
Pseudo $R^2$	0.295	0.176

NOTE: Standard errors are in parentheses. Base education group = no apprentice, no high school degree. \*\*\* = Statistically significant at the 1% level; \*\* = statistically significant at the 5% level; \* = statistically significant at the 10% level.

<sup>a</sup> Spell = at least six days after separation.

<sup>b</sup> Perm = 1 for observations after separation if time between the two jobs exceeded one year.

<sup>c</sup> The Sep<sub>*t*</sub> variables equal 1 in the *t*th year after separation.

SOURCE: Authors' calculations from DADS data.

**Table 5.14 Earnings Regressions for Censored Regression Models for Germany**

Variable	Displaced		Separated	
Sep <sub>-6</sub>	-0.118***	(0.0177)	0.020***	(0.0089)
Sep <sub>-5</sub>	-0.107***	(0.0107)	0.014***	(0.0059)
Sep <sub>-4</sub>	-0.084***	(0.0082)	0.008*	(0.0047)
Sep <sub>-3</sub>	-0.095***	(0.0068)	-0.002	(0.0040)
Sep <sub>-2</sub>	-0.105***	(0.0058)	-0.007	(0.0034)
Sep <sub>-1</sub>	-0.112***	(0.0050)	-0.021***	(0.0029)
Perm <sup>a</sup>	-0.217***	(0.0150)	-0.289***	(0.0074)
Sep <sub>1</sub> <sup>b</sup>	-0.121***	(0.0045)	-0.047***	(0.0027)
Sep <sub>2</sub>	-0.125***	(0.0049)	-0.040***	(0.0030)
Sep <sub>3</sub>	-0.124***	(0.0054)	-0.041***	(0.0033)
Sep <sub>4</sub>	-0.110***	(0.0061)	-0.034***	(0.0037)
Sep <sub>5</sub>	-0.101***	(0.0074)	-0.040***	(0.0045)
Sep <sub>6</sub>	-0.110***	(0.0108)	-0.050***	(0.0063)
Age	0.051***	(0.0007)	0.055***	(0.0006)
Age <sup>2</sup> /100	-0.055***	(0.0008)	-0.060***	(0.0008)
1985	0.015***	(0.0019)	0.016***	(0.0018)
1986	0.053***	(0.0019)	0.055***	(0.0018)
1987	0.080***	(0.0019)	0.083***	(0.0018)
1988	0.116***	(0.0019)	0.122***	(0.0018)
1989	0.111***	(0.0019)	0.117***	(0.0018)
1990	0.100***	(0.0019)	0.104***	(0.0019)
Apprentice, no high school	0.175***	(0.0012)	0.184***	(0.0012)
No apprentice, high school	0.330***	(0.0081)	0.341***	(0.0075)
Apprentice, high school	0.408***	(0.0050)	0.434***	(0.0045)
Polytechnic	0.549***	(0.0031)	0.571***	(0.0029)
University	0.604***	(0.0038)	0.625***	(0.0033)
Education unknown	0.080***	(0.0026)	0.082***	(0.0025)

(continued)

**Table 5.14 (continued)**

Variable	Displaced	Separated
Constant	3.143*** (0.0150)	3.045*** (0.0140)
No. of obs.	267,044	323,916
Pseudo $R^2$	0.4950	0.4255

NOTE: Standard errors are in parentheses. Base education group = no apprentice, no high school degree. \*\*\* = Statistically significant at the 1% level; \* = statistically significant at the 10% level.

<sup>a</sup> Perm = 1 for observations after separation if time between the two jobs exceeded one year.

<sup>b</sup> The Sep<sub>*i*</sub> variables equal 1 in the *i*th year after separation.

SOURCE: Authors' calculations.

# Appendix A

## Correction for False Firm Deaths in France

Suppose we observe  $n_1$  workers associated with firm  $j_1$  in the last available year for the firm (prior to 1996), and a share  $p_{1k}$  were observed the following year in firm  $j_k$ ,  $k \neq 1$ . Using  $p_{1k}$  as an estimator of  $\tilde{p}_{1k}$ , the true share of workers moving from firm  $j_1$  to firm  $j_k$ , we take a normal approximation to the underlying binomial distribution under which the standard error of  $p_{1k}$  is  $\sigma_{1k} = \sqrt{\frac{p_{1k}(1-p_{1k})}{n_1}}$ . Thus, if for any  $k$ ,  $k \neq 1$ ,  $p_{1k} + 2\sigma_{1k} \geq 0.5$ , we cannot reject the hypothesis that at least 50 percent of the firm's workforce moved together to the same successor firm ( $\tilde{p}_{1k} \geq 0.5$ ) at the 95 percent confidence level. If this is the case for any  $k \neq 1$ , we consider only separations to firms for which we can reject  $\tilde{p}_{1k'} \geq 0.5$ , i.e., for which  $p_{1k'} + 2\sigma_{1k'} < 0.5$ , to be real separations. All of these are classified as separations for reasons other than displacement, since there is at least one possible successor firm to  $j_1$ . All changes in firm identifier for individuals moving to firm  $k''$  with  $p_{1k''} + 2\sigma_{1k''} \geq 0.5$  are considered to be false firm deaths, and are not coded as separations.<sup>1</sup> In the event that the test statistic is less than 0.5 for all  $k$ ,  $k \neq 1$ , we maintain the estimated firm-death date. This procedure leads us to reclassify 26 percent of our estimated firm deaths in France as false firm deaths.

### Appendix Note

1. We nevertheless restart the seniority counter at zero the year following the false firm death. This is because the individuals moving to a new firm identifier in this manner are "new employees" for the successor firm, despite their experience with the predecessor firm.





# **Appendix B**

## **Definitions of Displacement**

**Table 5.B1 Type of Closures for France and Germany**

Country: year	Total separations	Closure within 1 yr.		Closure within 2 yr.		Contraction by 40%	
		No.	%	No.	%	No.	%
France <sup>a</sup>							
1984	8,309	2,498	30.06	2,821	33.95	n.d. <sup>b</sup>	—
1985	8,620	3,159	36.65	3,487	40.45	n.d.	—
1986	8,730	2,993	34.28	3,365	38.55	n.d.	—
1987	10,517	3,072	29.21	3,633	34.54	n.d.	—
1988	8,439	3,238	38.37	3,557	42.15	n.d.	—
1989	15,459	5,622	36.37	6,349	41.07	n.d.	—
Σ	60,074	20,582	34.26	23,212	38.64	n.d.	—
Germany							
1984	3,181	432	13.58	637	20.02	1,101	34.64
1985	2,777	423	15.23	625	22.50	1,097	39.50
1986	2,464	402	16.31	530	21.50	955	38.75
1987	2,030	323	15.91	460	22.66	774	38.12
1988	1,821	294	16.14	420	23.06	729	40.03
1989	2,117	263	12.42	375	17.71	755	35.66
1990	1,805	227	12.57	227	12.57	5.70	31.57
Σ	16,191	2,364	14.59	3,274	20.21	5,981	36.93

<sup>a</sup> For France, multiple observations in the same year are aggregated to the unique individual-year level.

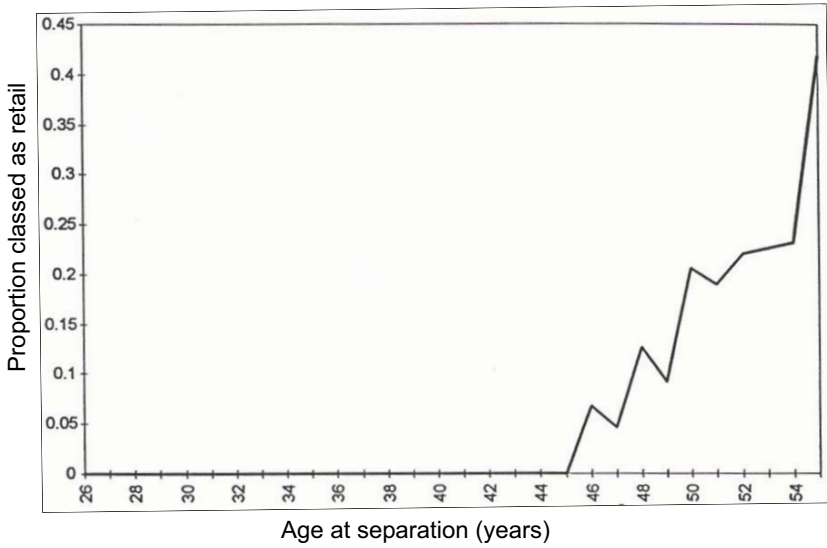
<sup>b</sup> n.d. = no data available.

SOURCE: Authors' calculations from DADS and IAB data.

# Appendix C

## Impact of Retirement Constraint in France

Figure 5.C1 Impact of Retirement Constraint by Age at First Separation for France





# Appendix D

## Descriptive Statistics for France

**Table 5.D1 Sample Statistics for 1984 for France**

Variable	Continuously employed 1984-89	First separation: displacement	First separation: other reason
Age	37.82 (6.93)	37.65 (7.20)	38.26 (7.37)
Log (average daily earnings) <sup>a</sup>	-1.65 (0.45)	-1.81 (0.50)	-1.73 (0.57)
4 ≤ Seniority < 6	0.17	0.22	0.26
6 ≤ Seniority < 8	0.23	0.25	0.26
8 ≤ Seniority < 10	0.03	0.04	0.03
10 ≤ Seniority	0.58	0.48	0.46
No educational certification	0.20	0.20	0.20
Elementary school	0.26	0.26	0.26
Junior high school	0.06	0.06	0.06
High school	0.04	0.04	0.04
Basic vocational school	0.29	0.30	0.29
Advanced vocational school	0.06	0.06	0.06
Undergraduate university	0.04	0.04	0.04
Graduate school and grande école	0.05	0.05	0.05
No. of obs.	54,918	16,876	27,685

NOTE: Standard deviations are in parentheses. Table constructed with one observation per person per year.

<sup>a</sup> In thousands of 1980 francs.

SOURCE: Authors' calculations from DADS data.



# Appendix E

## Treatment of Censoring in Germany

Values for Germany appear in Table 5.E1. There are 16,195 first separations between 1984 and 1990. Of those, 4,242 do not return to the labor force within the observation period, and 2,943 do not claim benefits. In the subsample of workers who are displaced (according to definition 2 above), only 8 percent do not claim benefits after separation and do not return into the sample.

**Table 5.E1 Separation and Censoring in Germany**

Group	No.	Percent
First separations, 1984–90	16,195	100.00
Return to work	11,953	73.81
Do not return to work	4,242	26.19
Claim benefits	1,299	30.62
Do not claim benefits	2,943	69.38





# **Appendix F**

## **Descriptive Statistics for Germany**

**Table 5.F1 Sample Statistics for 1984 for Germany**

Variable	Continuously employed 1984–90		First separation: displacement		First separation: other reason	
Age	39.42	(7.30)	39.10	(7.30)	37.59	(7.40)
Daily wage <sup>a</sup>	85.01	(21.07)	77.15	(21.07)	83.15	(21.88)
Log of daily wage	4.41	(0.30)	4.30	(0.30)	4.38	(0.27)
4 ≤ Seniority < 6	15.89	—	18.74	—	26.52	—
6 ≤ Seniority < 8	13.79	—	17.24	—	17.47	—
8 ≤ Seniority < 10	25.76	—	29.13	—	25.23	—
10 ≤ Seniority	44.47	—	26.90	—	23.81	—
No apprentice, no high school	19.55	—	18.41	—	17.21	—
Apprentice, no high school	68.72	—	71.22	—	66.85	—
No apprentice, high school	0.37	—	0.26	—	0.47	—
Apprentice, high school	1.05	—	0.96	—	1.44	—
Polytechnic	3.53	—	1.49	—	4.46	—
University	2.63	—	1.03	—	4.46	—
Education unknown	4.10	—	6.59	—	5.09	—

Plant size, 1982	3,086	(8,376)	160	(394 )	1,653	(5,003)
Plant size, 1982 (Median)	369	—	34	—	173	—
Sector						
1: Primary	0.59	—	3.72	—	1.83	—
2: Energy	2.59	—	0.39	—	0.98	—
3: Mining	1.08	—	1.39	—	1.86	—
4: Manufacturing	54.40	—	42.45	—	46.37	—
5: Construction	7.95	—	21.41	—	11.60	—
6: Distributional services	13.09	—	20.61	—	19.18	—
7: Industry services	6.08	—	4.52	—	6.79	—
8: Consumer services	1.24	—	1.03	—	1.38	—
9: Public services	12.93	—	4.42	—	9.97	—
No. of obs.	32,235		3,003		10,266	

NOTE: Standard deviations are in parentheses.

<sup>a</sup> In German Marks (deflated to 1975 prices).



# **Appendix G**

## **Probit Models for the Incidence of Displacement Using the Continuously Employed as the Reference Group in France**

**Table 5.G1 Probit Models of Incidence of Separation by Type Relative to Continuously Employed in France in 1984**

Variable	Displacements		Other separations	
Age	-0.0104	(0.0145)	-0.0090	(0.0113)
Age <sup>2</sup> /100	0.0184	(0.0188)	0.0165	(0.0145)
4 ≤ Seniority < 6	0.2268***	(0.0240)	0.3764***	(0.0181)
6 ≤ Seniority < 8	0.1453***	(0.0227)	0.1989***	(0.0177)
8 ≤ Seniority < 10	0.1529***	(0.0489)	0.0414	(0.0462)
Elementary school	-0.1076	(0.0728)	0.0112	(0.0578)
Junior high school	0.0989	(0.1072)	0.0273	(0.0886)
High school	0.1504	(0.1303)	0.0940	(0.1076)
Basic vocational school	-0.1130	(0.0697)	-0.1009*	(0.0569)
Advanced vocational school	-0.2434*	(0.1244)	-0.0669	(0.0877)
Undergraduate	0.1933	(0.1216)	0.2030**	(0.0940)
Graduate school and grande école	0.0065	(0.1165)	0.3766***	(0.0802)
Constant	-2.0991***	(0.2920)	-1.6256***	(0.2243)
No. of obs.	71,794		82,603	
Log likelihood	-11,264.46		-19,432.70	

NOTE: Standard errors are in parentheses. Estimates include data from 1984 only, aggregated to one observation per individual. All models also include controls for sector (15 categories) and skill level (3 categories). Reference groups: no educational certification and 10 or more years of seniority. Models estimate the probability of specified type of separation relative to workers who were continuously employed with the same firm throughout the sample window (1984–1989). \*\*\* = Statistically significant at the 1% level; \*\* = statistically significant at the 5% level; \* = statistically significant at the 10% level.

SOURCE: Authors' calculations from DADS data.

# **Appendix H**

## **Weibull Proportional Hazard Model for Germany**



**Table 5.H1 Weibull Proportional Hazard Models for Germany**

Variable	All separations		Other separations		Displacements	
Age	-3.2793***	(0.2255)	-3.7131***	(0.2597)	-1.9628***	(0.4639)
6 ≤ Seniority < 8	0.0248	(0.0570)	0.0228	(0.0641)	0.0664	(0.1284)
8 ≤ Seniority < 10	0.0633	(0.0531)	0.0293	(0.0602)	0.2250**	(0.1177)
10 ≤ Seniority	-0.0232	(0.0617)	-0.1118	(0.0704)	0.3081***	(0.1321)
Displacement	0.4250***	(0.0387)	—	—	—	—
Apprentice, no high school	0.4008***	(0.0407)	0.4332***	(0.0468)	0.3000***	(0.0826)
No apprentice, high school	0.2073	(0.3041)	0.2422	(0.3367)	0.0591	(0.7156)
Apprentice, high school	0.0200	(0.1710)	0.3562*	(0.1935)	-0.7274**	(0.3639)
Polytechnic	0.2319*	(0.1309)	0.3627***	(0.1421)	-0.2392	(0.3426)
University	0.0909	(0.1276)	0.2074	(0.1302)	-1.9875**	(1.0042)
Education unknown	0.0522	(0.0721)	0.0748	(0.0842)	-0.0251	(0.1404)
1985	0.1383***	(0.0485)	0.1707***	(0.0564)	0.0949	(0.0963)
1986	0.2598***	(0.0547)	0.2658***	(0.0626)	0.2745***	(0.1137)
1987	0.2319***	(0.0619)	0.3066***	(0.0706)	0.0180	(0.1302)
1988	0.2537***	(0.0694)	0.2971***	(0.0794)	0.1344	(0.1437)
1989	0.2703***	(0.0781)	0.3438***	(0.0879)	0.0447	(0.1732)
1990	0.0950	(0.1026)	0.0222	(0.1170)	0.7691***	(0.2106)

Constant	-2.3947***	(0.1054)	-2.1522***	(0.1184)	-2.8565***	(0.2349)
Weibull shape parameter	0.51		0.49		0.56	
No. of obs.	5,019		3,998		1,021	
No. of failures	3,720		2,813		907	
Log likelihood	-9666.48		-7531.57		-2087.78	

NOTE: Standard errors are in parentheses. Right censoring occurs when the individual is not reemployed by December 1990. \*\*\* = Statistically significant at the 1% level; \*\* = statistically significant at the 5% level; \* = statistically significant at the 10% level.



# **Appendix I**

## **Estimates Comparing Different Definitions of Displacement for Germany**

**Table 5.I1 Constrained Earnings Regressions for Germany: Displaced Workers**

Variable	Within 1 year		Within 2 years		40 Shrinkage	
Perm <sup>a</sup>	-0.2087***	(0.0220)	-0.2161***	(0.0169)	-0.2318***	(0.0123)
Sep <sub>1</sub> <sup>b</sup>	-0.0233***	(0.0075)	-0.0228***	(0.0062)	-0.0331***	(0.0045)
Sep <sub>2</sub>	-0.0333***	(0.0083)	-0.0291***	(0.0069)	-0.0410***	(0.0050)
Sep <sub>3</sub>	-0.0353***	(0.0094)	-0.0307***	(0.0078)	-0.0435***	(0.0056)
Sep <sub>4</sub>	-0.0286***	(0.0106)	-0.0189***	(0.0088)	-0.0360***	(0.0063)
Sep <sub>5</sub>	-0.0339***	(0.0127)	-0.0162	(0.0104)	-0.0437***	(0.0075)
Sep <sub>6</sub>	-0.0499***	(0.0176)	-0.0343**	(0.0144)	-0.0576***	(0.0105)
Age	6.3572***	(0.3513)	6.1706***	(0.2909)	5.8927***	(0.2112)
Age <sup>2</sup> /100	-7.1835***	(0.4260)	-6.9319***	(0.3529)	-6.4522***	(0.2561)
1985	-0.0065	(0.0091)	-0.0007	(0.0076)	0.0042	(0.0055)
1986	0.0351***	(0.0093)	0.0389***	(0.0078)	0.0437***	(0.0056)
1987	0.0720***	(0.0096)	0.0710***	(0.0081)	0.0769***	(0.0058)
1988	0.1064***	(0.0100)	0.1065***	(0.0084)	0.1114***	(0.0060)
1989	0.1183***	(0.0105)	0.1133***	(0.0088)	0.1204***	(0.0063)
1990	0.1259***	(0.0114)	0.1167***	(0.0096)	0.1204***	(0.0068)
Apprentice, no high school	0.1816***	(0.0064)	0.1883***	(0.0052)	0.2041***	(0.0038)
No apprentice, high school	0.3962***	(0.0510)	0.4260***	(0.0442)	0.3774***	(0.0314)

Apprentice, high school	0.3247***	(0.0267)	0.3799***	(0.0211)	0.4318***	(0.0147)
Polytechnic	0.6629***	(0.0222)	0.6363***	(0.0181)	0.6263***	(0.0098)
University	0.6635***	(0.0258)	0.6933***	(0.0216)	0.6787***	(0.0120)
Education unknown	0.0952***	(0.0109)	0.0918	(0.0089)	0.1097***	(0.0065)
Constant	2.8071***	(0.0709)	2.8521***	(0.0586)	2.9082***	(0.0427)
No. of obs.	15,346		21,519		39,669	
Pseudo $R^2$	0.2743		0.2980		0.3618	

NOTE: Standard errors are in parentheses. Base education group = no apprentice, no high school degree. \*\*\* = Statistically significant at the 1% level; \*\* = statistically significant at the 5% level.

<sup>a</sup> Perm = 1 for observations after separation if time between the two jobs exceeded one year.

<sup>b</sup> Sep<sub>*i*</sub> variables equal 1 in the *i*th year before or after separation.

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Peter J. Kuhn

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