HETEROGENEITY AMONG DISPLACED WORKERS[1]

Ben Kriechel[1] & Gerard A. Pfann[2]

Abstract

We combine post-displacement survey data with information from a displacing firm's personnel files in order to reveal sources of worker heterogeneity in search time and wage losses. First, we detail how experience-related characteristics affect workers' labor market careers during a period of three years after the bankruptcy of the firm. We find that wage losses are large. Interestingly, firm, rank, or job tenure do not explain observed wage differences. Idiosyncratic ability, job rotations prior to displacement, and differences in pre- and post-displacement job characteristics contribute most to observed variations in wages. The individual post-displacement labor market histories allow for testing the Blanchard-Diamond (Blanchard and Diamond 1994) ranking model for which we find no support. We then develop a dynamic reservation wage updating model. The method of updating is based on the simple idea that job seekers are informed about successful matches of their former colleagues (Rees (1966); Granovetter (1974)). The model fits the data well.

Keywords: Idiosyncratic Ability, Mass Lay-off, Social Networks, Unemployment
JEL codes: J33, J63, J65, C42

Words: 8227

[1] Business Investment Research Center, Maastricht University, PO Box 616, 6200 MD Maastricht, The Netherlands and IZA.
Email: B.Kriechel@mw.UniMaas.NL
Tel.: (+31-43) 388-3642, Fax: (+31-43) 388-4856.

[2] Institute for the Study of Labor (IZA), Postfach 7240, 53113 Bonn, Germany; Maastricht University, and CEPR.
Email: Pfann@iza.org
Tel.: (+49-228)38 94 112, Fax: (+49-228)38 94 210.

[1]We would like to thank the people at NORC at the University of Chicago – especially Norman Bradburn and Bob Lalonde – and Chris Flinn at NYU for their help in developing the questionnaire. We are grateful to Michael Burda, Janet Currie, Tor Eriksson, Dan Hamermesh, Rosemary Hyson, Peter Kuhn, Ken Troske, Jan van Ours and participants at conferences and seminars in Maastricht, Aarhus, Baltimore and Stockholm for their stimulating comments. The N.W.O. Pionier program and S.W.O.L. provided financial support.

1 Introduction

Displacement wage losses have been used to examine the transferability of human capital. Losses of firm specific skills are estimated as the returns to tenure at the displacing firm. The tenure variable is used as a proxy for the (specific) human capital that a worker has accumulated while working at that firm (Becker (1962); Parsons (1972)). Addison and Portugal (1989) criticize earlier specifications of displacement wage losses which try to estimate loss of specific human capital through pre-displacement tenure in the firm. They show that the previous tenure is 'productive' also in new jobs, implying a partial transferability of human capital. Topel (1990) examines the losses associated with changing employment after displacement. He finds that more senior workers suffer from greater reductions in earnings compared to their junior counterparts. This suggests that some human capital is built up during the career which is (partly) destroyed upon displacement. Farber (1997) interprets this as economic redundancy of skills. In a later paper Farber (1999) finds that 30 percent of the return to tenure can be explained by heterogeneity while the other 70 percent should be seen as returns to specific investments. Neal (1995) examines the transferability of specific investments in human capital by examining industry specific returns to tenure. He finds that some returns to tenure are industry specific. Workers who continue their career after displacement within the same industry face lower wage losses. Dustmann and Meghir (2001) find positive returns to experience and firm tenure for skilled, but not for unskilled workers in Germany. Postel-Vinay and Robin (2002) also find

wage variation being explained by person-specific effects that vary across skill groups in France.

In this study, we analyze the effects of displacement for workers from a single large firm in the Netherlands. Because of the firm's bankruptcy, all workers are officially informed about their lay-off at the same date. The data we use contains detailed information on the accumulated human capital in relation to the occupation held and the career developed within the firm. Together with the workers' hierarchical positions, their job characteristics, job rotations, and promotions, we are able to thoroughly investigate the composition of wage differences before and after the demise of the firm. Moreover, using a post-displacement survey, we can combine workers' pre-displacement occupational and career characteristics with specific information on the search process and the eventual new job characteristics.

We find that wage losses are functions of characteristics of jobs before and after displacement. Tenure with the firm, rank or job does *not* explain wage losses. Significant pre-displacement variables are the type of job, the number of job rotations in the last rank, performance evaluation scores, as well as a measure of idiosyncratic ability. Post-displacement co-variates explaining wage losses are industry-specific characteristics, changes in responsibility on the job and carried over job-related know-how.

The combination of detailed pre- and post-displacement information of job characteristics, wages, and search history also allows us to develop and estimate a simple model of dynamic updating of idiosyncratic reservation wages. The updating is a product of learning from information about successful matches

obtained from former colleagues with similar characteristics. The idea is based on the observation that after the bankruptcy many former employees became members of clubs where people met regularly (see also Rees (1966); Granovetter (1974)). The updating model is strongly supported by the data.

The paper is organized as follows. In Section two we describe the data, including the development of the post-displacement survey. In Section three we analyze variation in search time needed to find the first job. Pre- and post-displacement earnings differences are evaluated in Section four. In Section five, we propose a dynamic updating model to perform an integrated analysis of search time and wage losses. Section six concludes.

2 The Displaced Worker Survey and Personnel Data

The displacement literature has long recognized the role of heterogeneity among workers in understanding observed post-displacement search time and pre- and post-displacement earnings differences among workers. Compared to regular lay-offs displaced workers should be able to distinguish themselves as they are not specifically selected into unemployment but part of a firm that closed down. This should, according to Gibbons and Katz (1991)), lead to better labor market prospects compared to the average unemployed worker. The analysis of losses from displacement presented in this paper primarily focuses

on worker-specific heterogeneity.

In the U.S. wage losses of 10 to 30% for displaced workers are reported (Ruhm (1991) and Kletzer (1998)). Jacobson, LaLonde and Sullivan (1993) use (unemployment insurance) administrative data to show that displaced workers do not only suffer from wage losses upon displacement but also lag behind in average wage growth several years before being displaced. For Europe the following picture emerges from the currently available literature: Earnings losses range from nothing at all (Abbring, van den Berg, Gautier, Gijsbert, van Lomwel, van Ours and Ruhm (2002), Bender, Dustmann, Margolis and Meghir (2002)) to somewhat less than 10% (Albæk, van Audenrode and Browning (2002); Borland, Gregg, Knight and Wadsworth (2002); Burda and Mertens (1998))[2]. Several explanations for these differences have been offered. An institutional one is that European countries offer generous social security payments which allow displaced workers to search for new jobs using the social security cushion. Compared to their American counterparts European workers are less likely to be forced into accepting lower paid jobs. This increases the observed search time and the probability of finding a better match. But the administrative data used in the European studies does not contain information sufficiently detailed to properly estimate the variation of displacement wage losses across individuals, and how that variation depends on careers, job rotations, rank tenure and other specifications of the jobs held before as well as

[2]One recent exception is Couch (2001), who finds in the German GSOEP data that annual earning (not wages) of displaced workers declined by 13.5 percent in the year following plant closure.

after displacement.

The year 1996 marked the end of a proud history of more than 75 years of aircraft production by the Dutch company Fokker. Founded by one of the pioneers of aviation and aircraft design, Anthony Fokker, the company first blossomed in the 1920s when it became the world leader in aircraft construction, producing in both the Netherlands and the United States. After the destruction of the production facilities during the Second World War, Fokker remained one of the smaller players in the world aircraft industry, producing predominantly civilian mid-range airplanes of 50 to 100 seats. In March 1996 it filed for bankruptcy and 5644 workers lost their tenured jobs. The bankruptcy trustees created a new company, called Fokker Aviation, which contained the viable remains of the old firm. A total of 953 workers were simultaneously fired from the bankrupt firm and hired by Fokker Aviation. Another group of 700 workers was offered a contract to continue working for the trustees to finish building airplanes already sold to airline companies; 3991 workers were permanently displaced (Table 1).[3]

We use data from two sources. Fokker's electronic personnel data system provided information about workers'pre-displacement careers inside the firm. In 1999 post-displacement information was gathered through a mail survey among all workers who were laid off after the firm's bankruptcy. Current addresses of the respondents were obtained from the bankruptcy trustees. Information from the Fokker Pension Fund was used to check upon deceased

[3]The bankruptcy trustees sold Fokker Aviation to STORK in 1997. For a complete description see Trustee report (Deterink, Knüppe, Leuftink and Schimmelpenninck 1997).

employees. The addresses of deceased former employees were omitted from the address files used for the survey. The 'Fokker Survey' collected data on the labor market experience for the three years following the workers' displacement. This survey data has been linked to the information from the personnel files.

The Personnel Data

From Fokker's personnel files we obtained information on each employee's type of job, compensation, and demographics. Demographic characteristics include date of birth, gender, education, marital status, and the hiring date of each employee. The average tenure at the time of bankruptcy was 15 years. The firm's hierarchy distinguishes 8 different levels below top management. The highest observable step, the eighth level, is just below the top management and the Board of Directors. For reasons of possible identification, the two upper levels (9 and 10) were left out of the data-set.

The hierarchical structure roughly reflects the division of unskilled versus skilled workers as well as the organization of supervision. Production workers are located in levels 1 to 3. Managers, engineers, and aircraft designers belong to levels 4 to 8.[4] Every position is 'allocated' to a job activity. These activities are Administration, Sales, Management, Human Resources, R&D as well as Production Preparation, Production Planning, Support, Production and

[4]For a detailed description of the company's structure in 1987-1996 see Dohmen, Kriechel and Pfann (2002)

Quality Control. Job rotation is defined as the number of lateral job changes within a given hierarchical level. The lateral job change is a movement across job activities without changing the hierarchical position to a higher (or lower) level job. In addition to the normal tenure variable, we observe tenure within the hierarchy and tenure within a specific position (job). The latter two tenure variables were measured in months rather than years for the last position held before lay-off.

We have calculated the unemployment insurance benefits paid to the worker, as well as the duration for which they were eligible. These calculations were according to the Dutch regulations: On the day of the bankruptcy every worker faces a six week firing period in which they receive their salary[5]. Older workers are entitled to a longer firing period. The original six weeks are extended by one week per year of tenure while the worker was older than 45 years. The maximum firing period after a bankruptcy is 19 weeks.

After the firing period workers receive unemployment insurance benefits. The unemployment insurance pays 70 percent of the former salary, with a maximum of 55000 Dutch guilders. This implies a replacement ratio of 0.7 for all workers receiving less than 78752 Dutch guilders annually. Sixteen percent of our sample received annual salaries above this amount leading to lower replacement ratios for those workers.

The length of the UI payments depends on the labor market experience of the worker. A worker is entitled to UI payments if he has worked 4 out of the 5

[5]The salary payments after a bankruptcy are paid out by the Dutch social security offices. They are guaranteed regardless of the expected bankruptcy outcome.

years prior to becoming unemployed. Workers who worked for 4 years are entitled to 6 months of UI payments. After 5 years worked, this rises to a total of 9 months, and to a total of 12 months after 10 years worked. Beyond 10 years of labor market experience a workers' entitlement increases by an additional 6 month for every additional 5 years he worked. The maximum entitlement is 60 months.

A Measure of Idiosyncratic Ability

Learning models (Farber and Gibbons (1996); Altonji and Pierret (2001)) suggest that idiosyncratic worker ability is not readily observable and that the residual of an unrestricted regression of wage equation is a martingale. In time-series representations of wage equations that martingale is often found to be of order I(1) (see for example Pfann and Palm (1993), for Dutch as well as UK wage models). This implies that the model's first-order Koyck transformation – the wage growth – is stationary and that the residual distribution of a regression – corrected for selective separations (quits and lay-offs) – measures the distribution of idiosyncratic worker ability revealed to the employer but not to the econometrician.

We compare the 1993-1996 residuals of an unrestricted regression of the wage growth during the last three years at the firm as a proxy of the distribution of idiosyncratic worker ability at the time of the mass lay-off. If this measurement is indeed a good proxy for unobserved ability we expect it to be negatively correlated with search time, uncorrelated with starting wages, and

positively correlated with earnings three years after displacement.

Alternatively, however, positive residual wage growth of the final years at the firm could also result from increased 'risk' premiums paid to some workers to entice them to stay and fight the firm's demise. If such premiums are based on unobserved firm-specific skills only, we should expect that the residual is uncorrelated with search time after displacement and negatively correlated with the starting wage as well as with the wage earned after three years.

The 'Fokker Survey'

The mail-survey consisted of 14 pages, covering the labor market history of the three years after the displacement. A respondent needed approximately 30 minutes to complete the questionnaire, excluding additional time needed to search for precise information. The questionnaire was sent out in April 1999 to all 5506 workers in the survey population (see Table 1). In total, 2279 ex-Fokker workers returned completed questionnaires (response rate equals 41.4 percent[6]). In appendix 6 we report results of the non-response analysis. The survey results are of high quality for a self-administered mail survey. We could validate some of the given information by comparing the reported salary earned with Fokker to the information available from the administrative files. Many respondents were able to fill in the exact amount of gross monthly salary which they earned three years prior to the survey. In a validation study for the

[6]Surveys in the Netherlands have low response rates compared to the rest of Europe. Dutch Statistics report 50% and 60% response for the 'Quality-of-Life' and the 'Labor Force Survey' respectively. Labor Force Surveys in other European countries have response rates between 82 and 93% (cf. Geuzinge, van Rooijen and Bakker (2000)).

PSID, Bound, Brown, Duncan and Rodgers (1994) also find reported wages to be rather accurate on average. The mean error of log earnings found in Bound et al. (1994) is 0.007. This is of the same magnitude as the mean error of 0.006 in our study. The standard deviation of our sample is 0.34. This is only slightly higher than the standard deviation of 0.32 reported by Bound et al. (1994).

The survey asked for information on the first and the current job. Respondents reported the date at which they started to work in the new position, their starting wage and hours worked. Information was also collected on the type of firm. We categorize new employers as belonging to the aircraft industry, other manufacturing industries, or non-manufacturing. The respondents were asked to assess their responsibility in their new job compared to that before displacement. On a five point scale, the middle category reflecting a similar level of responsibility, they could indicate 'more', and 'much more' responsibility on the one hand, or 'less' and 'much less' on the other hand. Furthermore, we collected information on the prerequisites for the new job – as perceived by the respondent –. Here the answer categories were: 'both their work experience and their technical knowledge obtained while working with Fokker was necessary to obtain the new job', 'only the work experience' or 'only the technical knowledge' was necessary, a category in which neither their experience nor their technical knowledge was strictly necessary, and finally as last category, neither work experience nor technical knowledge was necessary at all.

3 Post Displacement Search Time

In the survey a question asking for the labor market status of every month until three years after displacement was included. This information allows us to examine the time needed to find new employment. In the analysis presented we focus on the time it takes to find the first job after displacement. Following Meyer (1990) we included the remaining duration of unemployment benefits. Theoretically, the remaining duration of the unemployment benefits should have an effect on the duration of unemployment: unemployment benefits are the 'returns' during the search process. The higher they are the longer one can sustain searching for a job while maintaining a high reservation wage. Unemployment insurance covers some percentage of the former salary (the replacement ratio). The duration of the payments depends in our data on the employment history. Near the exhaustion point of the unemployment insurance payments, workers face the prospect of lower benefits. Hence, workers are more likely to accept any job offered. We include the remaining duration of the unemployment benefits for each worker in the form of splines. Note that the duration of benefits are pre-determined and known to the worker. In our sample the average duration of the benefits is 88 weeks.

Other explanatory variables are education, age, tenure, type of job activity while working with Fokker, and the hierarchical level achieved before displacement. A career can be identified by the hierarchical level achieved, but also within a hierarchy by the amount of lateral movements – i.e. across departments. The latter reflects job rotation intensity and can be interpreted as

the workers' breadth of job experience. To capture this element we include the number of lateral movements within the last hierarchy achieved. Workers who do not find any employment in the period of 36 months are right censored.

In the empirical analysis of the period of time it takes to find the first job, all workers who were offered a contract from the bankruptcy trustees are left out as they experience no initial unemployment spell. Additionally, we exclude those employees who do not classify themselves in the survey as unemployed because they have either started their own business[7] (self-employment, 2.5% of sample), are full-time involved in voluntary activities or other types of unpaid work, receive disability pensions, or have retired since bankruptcy (together 2.2% of the sample).

Table 2 presents the estimation results of a proportional hazard Weibull model with gamma correction for unobserved heterogeneity. The data replicate the standard patterns found in the empirical literature. In summary we find – but do not present the estimates in Table 2 – the following results. Search time increases with age. Younger workers find new jobs faster. High-tenure worker also have longer search oeruids. With the exception of a shorter search

[7]Self-employment is one route out of unemployment. However, as the self-employment decision and the self-employment income seems to differ significantly from wage outcomes of comparable employed individuals. In fact Hamilton (2000) concludes: "[...] self-employment offers significant nonpecuniary benefits, such as 'being your own boss.' Many entrepreneurs have not only lower initial earnings than employees with the same observed characteristics but also lower earnings growth Hamilton (2000, page 628). In the specific data-set we use in our study the incidence rate into self-employment is way below the usual numbers. We will thus disregard the small group of self-employed in this paper.

time for graduates from technical universities educational levels seem to be insignificant. The hierarchical position is found to explain some of the time needed to find the first new job after displacement. Compared to the baseline category of the lowest hierarchy all (higher) hierarchical levels show shorter search periods, other things equal.

The remaining duration of unemployment benefits (in weeks) turns out to shorten the search time around the expiration time (Table 2). It does not have a significant effect for the splines of 4-8, or 8-12 weeks. The splines capturing the effects of UI benefits for periods longer than 12 weeks also indicate a shorter search time for longer remaining benefits. This last effect shows that not only around the exhaustion point, but also during the time in which benefits do not (threaten to) run out, new jobs are accepted. In our sample with high tenure workers and with a generous UI system many workers simply do not come near the exhaustion point. The average UI entitlement in our sample is 88 weeks which explains that many workers find employment while the remaining UI entitlement is still much longer than 12 weeks.

Search time is found to be inversely related to level of exit on the hierarchical ladder. More pre-displacement job responsibility increases the probability of finding new work after displacement. Workers higher in the hierarchy also found new jobs faster. Job rotations do not show a significant effect with respect to the duration of subsequent unemployment.

In the previous Section 2 we argued that idiosyncratic ability is either negatively correlated with search time (general unobserved ability) or uncorrelated

with search time (firm-specific risk premiums). Table 2 reports insignificance of the ability measure. This is evidence in favor of the idea that the firm in demise pays increasing risk premiums to workers to entice them to stay.

4 Displacement Losses

The wage difference between the pre-and post-displacement earnings is defined as

$$\Delta W_i \equiv W_i^a - W_i^F \tag{1}$$

where W_i^a is the monthly wage earned at the new job by worker i and W_i^F is the last wage earned before displacement. The wage difference can be explained by observable characteristics Z_i as follows.

$$\Delta W_i = Z_i\beta + u_{1i} \tag{2}$$

where β is a constant vector and u_{1i} is the residual unexplained by Z_i.

When post-displacement wages, W_i^a, are not available or unobserved, ΔW_i cannot be computed. The literature suggest to use as an upper bound of firm-specific human capital that can be lost upon transition from one firm to another the Mincer/Becker U-shaped tenure profile instead. Our data can replicate the standard tenure results. The fitted model of log wages at the day of displacement on tenure profiles, holding constant for education, age, and gender ($\hat{\alpha}X_i$) yields (t-statistics are given in brackets):

$$\ln(W_i^F) = \underset{(5.05)}{.02 \text{ Tenure}} - \underset{(-3.47)}{.28 \text{ Tenure}^2/1000} + \hat{\alpha} X_i \ , \quad \text{with } R^2 = .58$$

We observe ΔW_i only for workers who found a proper match. For those workers the offered wage W^a was above the reservation wage when the offer arrived. We thus only observe ΔW_i if

$$\Delta W_i^* \equiv W_i^a - W_i^F \geq 0 \tag{3}$$

and write

$$\Delta W_i^* = \Omega_i \gamma + u_{2i} \tag{4}$$

where Ω_i is a vector of characteristics determining the reservation wage of worker i and u_{2i} is a residual. We do not observe the reservation wage, but we do observe whether or not the worker found work as well as the starting salary W_i^a at the new job. We also know W_i^F. We assume that

$$u_{1i} \sim N(0, \sigma);$$
$$u_{2i} \sim N(0, 1);$$
$$corr(u_{1i}, u_{2i}) = \rho.$$

Then, the set of selection equations (3) and (4) can be written as the probability of having found an acceptable match as a linear function of characteristics Ω_i (Heckman 1979). To account for possible selection bias caused by non-randomness in finding new work, we need to identify differences between Z_i and Ω_i. Ω_i includes variables unobserved by the outside employers but known by the worker and to the former employer. The identifying variables should

affect the worker's reservation wage but not the outside wage offer W_i^a. Two variables are used. One variable records short spells of temporary inability to work (WAO) while being employed at Fokker during the period 1987-1996. We assume that asymmetric information on individual well-being lowers the reservation wage but not the outside offer. The other variable included records the last job performance evaluation score at Fokker in 1996. Performance scores, unobserved by potential employers, are positively correlated with reservation wages as they are associated with the quality of work and possibly with the quality of search. But they are assumed to be unrelated to the distribution of outside offers.

Displacement Losses: The First Job

Table 3 displays results from simultaneously estimating the earnings difference equation (2) and the selection equation (4). We included pre-displacement job characteristics (panel a) as well as post-displacement job characteristics (panel b). Both types of variables are important in explaining variation in observed wage losses. In the Regression, we also controlled for the standard tenure profiles at the firm, rank, as well as at the job level. Once we have controlled for old and new job specifications, *none* of these experience profiles contribute to explaining observed wage losses.

The average wage loss predicted for the median worker in the sample is found to be 11.9 percent. This number is much closer to the loss found in the US based on individual workers' data, and much larger than the numbers

reported for Europe based on administrative data. This may be due to the fact that these workers are very high tenured, quite old, and also probably worked for a high-wage firm. Given this, these results are probably not inconsistent with other European studies that look at a more representative set of displacements (see Kuhn (2002)).

The (pre-displacement)job characteristics variables reveal large differences in estimated wage losses due to different types of work. Compared to an administrative worker – who lost 11.9 percent – , R&D workers lost 7.1 percent more, production workers lost 6.3 percent more, while workers in production preparation faced a higher wage loss of 7.0 percent. Quality control workers lost 8.3 percent more. Workers in sales, planning, support, human resources and management did not encounter significantly higher wage losses than administrative workers. Hierarchical levels do not explain variation in wage losses.

The variable indicating the number of lateral movements between job activities on the same hierarchical levels turns out to lower wage losses significantly. This is an indication that job rotation within the same hierarchical level lowers wage losses by 3.2 percent per 'rotation'. This result is very interesting. It suggests that not the level itself is important for finding a good match, but that the obtained level of generality within each level cushions displacement losses. This is most likely a result from the fact that workers who experienced more job rotations in the displacing firm have more opportunities to find similar jobs in a larger variety of firms.

For the post-displacement jobs characteristics we find that workers remaining with the same industry suffer less wage losses. Compared to workers leaving

industrial jobs altogether, staying in the aircraft industry reduces wage losses by 4.2 percent. Compared to workers switching to other types of industries it can reduce wage losses by 2.2 percent. This corroborates results found for the US (Neal 1995). Workers who take on jobs for which their technical knowledge or their work experience was necessary see their wage losses diminish by 6 and 4 percent respectively. Note that job experience does not reflect (a) the time of the experience, nor (b) the specific firm where that experience was gained. Having jobs with lower responsibility increases wage losses. Somewhat lower responsibility translates to 5 percent wage losses, while much lower responsibility leads to 10 percent higher wage losses.

Idiosyncratic ability enters the wage loss equation significantly negatively. This is consistent with our prediction that Fokker had to pay a 'risk' premium to make workers stay during the period of demise.

Three Years Later: Testing the Ranking Model

Until now, we have only considered the characteristics of the first job after the bankruptcy. In order to examine effects of wage losses over time and of the length of unemployment we re-estimate the wage loss regression, but now using the wage that was earned three years after the bankruptcy, at the time the survey was conducted.

The estimate of $\Delta W = W_i^S - W_i^F$ (where W_i^S is the wage at the time of the survey) provides the opportunity to test Blanchard and Diamond's (1994) hypothesis of the ranking effect. The ranking effect assumes that firms receiv-

ing multiple acceptable applications hire the worker who has been unemployed for the shortest period.

The reason is that short unemployment spells signal – according to this theory – good, but unobservable, citizenship. Ranking and non-ranking models show similar unemployment dynamics and equilibrium wage outcomes, but different wage dynamics. The ranking model can be tested because in our survey we explicitly asked the respondents for detailed information on their employment history between the time of displacement and the time of the survey.

We define two additional variables in our model:

- the total amount of time unemployed between displacement and the date of the survey.
- the number of different employers between displacement and current job (0 = unemployed, 1 = current job is first job, 2 = current job is second job, etc.)

Both the ranking and the non-ranking model predict that the total time not worked enters the wage difference equation significantly negative. In the ranking model long unemployment duration signals below average skills. The ranking model assumes that the longer the inactive spell the lower the probability that a worker will be hired by another firm that can choose from multiple applicants. The ranking model would also predict the second variable to enter the wage difference equation significantly, whereas the non-ranking model would not. According to Blanchard and Diamond, given the unemployment

duration having multiple employers reduces a worker's possibility to *acquire a badge of good behavior*. Thus multiple employers lower the matched wage. The non-ranking model would not predict the effect of multiple employers on wages to be that negative. Table 4 shows the effects of the two additional variables on wage losses after three years of displacement. The longer a worker was unemployed the higher the observed wage losses. This is consistent with the predictions of the ranking model as well as the non-ranking model. Every month of unemployment adds 0.65 percentage point to the observed wage loss. But having multiple employers is not harmful. Quite the contrary, having had more employers reduces wage losses. This is a refutation of the ranking model.

Idiosyncratic ability turns out to be significantly negative, and the effect is much higher than that estimated for the first job after employment. This is not in line with the prediction that unobserved ability would have a negative effect upon first employment which is subsequently diminished over time as the new employer learns about the ability of the new worker.

We rather find support for the alternative prediction of the effect of 'risk premium' that Fokker paid to keep workers whom they needed to stay in the period of demise. As other firms do not face distress they do not need to offer such a risk premium.

5 Updating the Reservation Wage over Time

Table 5 shows the evolution of the nominal wages of observed matches after the bankruptcy. It reflects the downward sloping curve so often portrayed in

the search literature, and suggested to result from the endogenous interaction between search, duration of UI, adaptation of reservation wages, and hyperbolic discounting by the individual worker (Postel-Vinay and Robin 2002). How the adaptation of the reservation wage over time actually takes place is not well explained in the literature. Although often referred to as 'learning' and modelled as a stochastic process accordingly, it remains unclear how updating of the reservation wage actually occurs. Many view the adaptation process as random, some say it depends on individual wealth (Bloemen and Stancanelli 2001). Randomness is often assumed to result from trial and error. In fact, for this to work a job-seeker needs the input of a large sequence of job-interviews. But invitations for interviews are rare, and once invited for an interview the rejection probability is remarkably low: 26.75 percent receive an offer which is rejected, however most of those workers have received multiple offers around the same time. If anything, the process should be one that is based on – often unobserved – unsuccessful applications that determine the reduction of reservation wages over time until a successful match is found.

We propose a different method of updating. It is based on the observation that after the bankruptcy many former employees became members of clubs where people meet regularly. Most of these clubs have a recreational purpose – we counted 14 different clubs, varying from a bowling club to a yoga club – and two more general interest organizations that are responsible for the clubs' activities. These are the Association of Former Fokker Employees, with 2,000 members, and the Community of Interests of Ex-Employees of Fokker, that had 1,100 members at the time we conducted our survey. Our assumption is simple.

Rather than basing the consideration of when and by how much to adjust your reservation wage on idiosyncratic experiences alone we suggest that people in these clubs and organizations are informed about the successes and failures of people similar to them and that that information is used for updating. Although we do not have information on who was a member and how often people met, we do observe for every worker in the sample the characteristics of successful matches. The process of peer updating is modelled in the following way.

Each updating process needs time. We call this a period, and we assume that periods have similar lengths for all individual people. The risk set during each period consists of all workers who are job-seekers at the beginning of the period, N_t. A peer is defined as a worker with observable characteristics, X_{it}, being similar to job-seeker i in period t. $M_t > 0$ workers find jobs during period t. Their matched wages and wage losses are observed by all other workers, and the wages of recently matched colleagues may be standing in for unobserved variations in local labor market conditions. At the beginning of each consecutive period the risk set has been reduced to $N_{t+1} = N_t - M_t$. In the first period, the relative reservation wage of worker i is computed as:

$$RW_{i1} = f_1(\frac{W_{i1}}{\bar{W}_{-i1}}); i \in [1, N_1] \tag{5}$$

where W_{i1} is the last wage earned before displacement, and $\bar{W}_{-i1}$ is the average of all last wages earned by the other workers subject to displacement from the same firm.

In period $t > 1$, we order all job-seekers in the previous period $t-1$ according to the observed successes in finding a job during that period, starting with the successful ones. Define $\hat{W}_{jt-1}$ as the observed matched wage in period $t-1$ by the individual successful worker j, $j \in [1, M_{t-1}]$, and define W^*_{it} as the expected wage at the beginning of period t that would have been obtained by worker i, $\quad i \in [M_{t-1}+1, N_t]$ if a successful match is believed – by the job-seeker – to be independent of unobservable ability differences between fortunate workers and unfortunate job-seekers with similar characteristics, that is if matches would be thought of as strictly random among peers. We have

$$RW_{it} = f\left(\frac{W^*_{it}}{\bar{W}^*_{t-1}}\right) \quad , i \in [M_{t-1}+1, N_t] \quad , \quad t > 1 \, , \tag{6}$$

$$W^*_{it} = \Pr(I_{t-1} = 1 | X_{it}) \cdot E[\hat{W}_{it-1} | X_{it}] \tag{7}$$

$$\bar{W}^*_{t-1} = \Pr(I_{t-1} = 1) \cdot \frac{1}{M_{t-1}} \sum_{j=1}^{M_{t-1}} \hat{W}_{jt-1} = \frac{1}{N_{t-1}} \sum_{j=1}^{M_{t-1}} \hat{W}_{jt-1} \tag{8}$$

To calculate RW_{it} we need to specify how to obtain estimates for $\Pr(I_{t-1} = 1|X_{it})$ and for $E[\hat{W}_{it-1}|X_{it}]$. The first component is estimated as a simple Probit model of observed successful matches ($I_{t-1} = 1$) and unsuccessful workers ($I_{t-1} = 0$) during period $t-1$ given X_{it}. The assumed randomness of successful matches among peers allows us to compute the simple OLS regression of observed matches on characteristics X_{jt} , and use the estimated coefficients to compute the predicted wage $E[\hat{W}_{it-1}|X_{it}]$. Finally, we assume linearity for

the functional form $f_t(\cdot)$, so that

$$RW_{it} = \lambda_t \left(\frac{W^*_{it}}{\bar{W}^*_{t-1}} \right) \tag{9}$$

The parameters λ_t will be estimated using a piecewise-constant hazard model suggested by Lancaster (1990) including the correction for heterogeneity as suggested by Murphy (1996). The likelihood function for this model is given in Appendix B.

Table 6 gives the results of the estimation. The relative position of the expected wages turn out to be highly significant. All else equal they predict longer search for higher expected wages. This confirms the idea that workers learn over time and observe the matches of their coworkers rather than trying to learn from their labor market failures alone. Based on matches of their coworkers they extrapolate their chances of finding a job and the market valuation of their skills. The first row of Figure 1 gives the distribution of the predicted chance that a worker will find new employment based on the observed matches of the previous period of his former colleagues. The second row presents the distribution of expected (log) wages also based on observed matches of former colleagues. The probability of employment times the expected wages – the third row – is the distribution of expected reservation wages. Note that the distribution is widely dispersed in the second time period, while it gets more concentrated in the later time periods. The estimated coefficients for the last two periods (time period four and five) are statistically insignificant.

Idiosyncratic ability is significantly negatively correlated with the first wage after displacement (Table 3), significantly negatively correlated with earnings three years later (Table 4), and positively but insignificantly correlated with search time (Table 6). From this we conclude that the residual of the wage growth equation does not reflect unobserved ability, but rather reflects increased 'risk' premiums paid by Fokker during the period of demise to prevent workers from leaving the firm.

6 Conclusion

We combined survey data from displaced workers and their personnel records from a bankrupt firm to investigate post-displacement differences in search time and earnings. We find that wage losses in the Netherlands are large and comparable to those found in the US. Since the workers in our data set are high tenured, relatively old, and probably worked for a high-wage firm, these results may not be inconsistent with other existing European studies that look at more representative sets of displacement.

Pre-displacement job-characteristics are found to be important predictors of both search time and earnings losses after displacement. Search time increases with age and tenure, whereas workers with a higher hierarchical position search significantly shorter than lower level workers. Although, the search-time seems to be largely unaffected by the specification of the job activity, it plays an important role in explaining displacement wage losses after displacement. The hierarchical level is inversely related to wage losses if employment

is found within a year, while it has no effect afterwards. Pre-displacement lateral job movements reduce earnings losses by 3.2 percent per job rotation. The wage-losses of all workers together were estimated amount to 11.9 percent. Staying within the same industry decreased the initial wage losses, but were insignificant after three years.

We analyzed the displacement effects of tenure with the firm, within ranks, and jobs. None of these tenure variables are found to contribute to explaining observed wage losses. Other information on characteristics of old an new jobs and how they differ nihilated the role of the variables traditionally suggested to represent firm-specific and not transferable on-the-job investments in productive human capital. This is surprising and possibly an important result. More research is needed that uses similar detailed information on pre- and post-displacement job-characteristics before we can draw further reaching conclusions. But for our data-set the explanation of firm-specific human capital to understand observed wage losses is not supported.

Our data refutes the Blanchard-Diamond (1994) ranking model. After a period of three years, workers who had multiple employers have lower wage losses.

Idiosyncratic ability, measured as the residual wage growth during the last three years at the displacing firm, turned out to be an important and insightful variable. Not because unobserved ability was found to be important to explain variation in post-displacement search time and wage losses, but because it revealed that the distressed firm had a wage policy of paying 'risk' premiums during its final years of existence to entice workers not to abandon

the distressed firm.

Allowing workers to learn from the labor market experience of their former co-workers and basing their search strategy on matching results observed of workers similar to them is found to be an important explanation of the simultaneous dynamics of reservation wages and observed unemployment durations. Similar workers who found high wage jobs increase the unemployed peer worker's reservation wage as well as the predicted search time. Workers from higher hierarchical positions find a new job faster than their lower ranked counterparts.

References

Abbring, J. H., van den Berg, G. J., Gautier, P. A., Gijsbert, A., van Lomwel, G. C., van Ours, J. C. and Ruhm, J. C.: 2002, Displaced Workers in the United States and the Netherlands, *in* P. J. Kuhn (ed.), *Loosing Work Moving on: Worker Displacement in International Perspective*, W.E. Upjohn Institute of Employment Research, Kalmazoo, Michigan.

Addison, J. T. and Portugal, P.: 1989, Unemployment Insurance and Unemployment Spells, *Southern Economic Journal* **56**(1), 166–182.

Albæk, K., van Audenrode, M. and Browning, M.: 2002, Employment Protection and the Consequences for Displaced Workers: a Comparison of Belgium and Denmark, *in* P. J. Kuhn (ed.), *Loosing Work Moving on: Worker Displacement in International Perspective*, W.E. Upjohn Institute of Employment Research, Kalmazoo, Michigan.

Altonji, J. G. and Pierret, C. R.: 2001, Employer Learning and Statistical Discrimination, *Quarterly Journal of Economics* **116**(1), 313–350.

Becker, G. S.: 1962, Investment in Human Capital: A Theoretical Analysis, *Journal of Political Economy* **70**(1), 9–49.

Bender, S., Dustmann, C., Margolis, D. and Meghir, C.: 2002, Worker Displacement in France and Germany, *in* P. J. Kuhn (ed.), *Loosing Work Moving on: Worker Displacement in International Perspective*, W.E. Upjohn Institute of Employment Research, Kalmazoo, Michigan.

Bethlehem, J. and Kersten, M.: 1986, *Werken met Non-Response*, PhD-Thesis, Universiteit van Amsterdam.

Blanchard, O. J. and Diamond, P.: 1994, Ranking, Unemployment Duration and Wages, *Review of Economic Studies* **61**(3), 417–434.

Bloemen, H. and Stancanelli, E.: 2001, Individual Wealth, Reservation Wages, and Transitions into Employment, *Journal of Labor Economics* **19**(2), 400–439.

Borland, J., Gregg, P., Knight, G. and Wadsworth, J.: 2002, They Get Knocked Down. Do They Get Up Again? Displaced Workers in Britain and Australia, *in* P. J. Kuhn (ed.), *Loosing Work Moving on: Worker Displacement in International Perspective*, W.E. Upjohn Institute of Employment Research, Kalmazoo, Michigan.

Bound, J., Brown, C., Duncan, G. J. and Rodgers, W. L.: 1994, Evidence on the Validity of Cross-sectional and Longitudinal Labor Market Data, *Journal of Labor Economics* **12**(3), 345–368.

Burda, M. and Mertens, A.: 1998, Estimating Wage Losses of Displaced Workers in Germany, *Labour Economics* **8**(2), 15–41.

Couch, K. A.: 2001, Earnings Losses and Unemployment of Displaced Workers in Germany, *Industrial and Labor Relations Review* **54**(3), 559–572.

Deterink, A., Knüppe, B., Leuftink, A. and Schimmelpenninck, R.: 1997, *Onderzoek naar de Oorzaken van het Faillissement van Fokker*, Kluwer, Deventer.

Dohmen, T. J., Kriechel, B. and Pfann, G. A.: 2002, Monkey Bars and Ladders: The Importance of Lateral and Vertical Movements in Internal Labor Market Careers, *Mimeo Maastricht* .

Dustmann, C. and Meghir, C.: 2001, Wages, Experience and Seniority, *Institute for Fiscal Studies WP 01/01* .

Farber, H. S.: 1997, The Changing Face of Job Loss in the United States: 1981-1995, *Brookings Papers on Economic Activity: Microeconomics* pp. 55–128.

Farber, H. S.: 1999, Mobility and Stability: The Dynamics of Job Change in Labor Markets, *in* O. Ashenfelter and D. Card (eds), *Handbook of Labor Economics, Vol. 3*, Elsevier Science, Amsterdam.

Farber, H. S. and Gibbons, R.: 1996, Learning and Wage Dynamics, *Quarterly Journal of Economics* **111**(4), 1007–1047.

Geuzinge, L., van Rooijen, J. and Bakker, B. F.: 2000, The Use of Administrative Registers to Reduce Non-Response Bias in Household Surveys, *Netherlands Official Statistics* **15**, 32–38.

Gibbons, R. and Katz, L. F.: 1991, Layoffs and Lemons, *Journal of Labor Economics* **9**(4), 351–380.

Granovetter, M.: 1974, *Getting a Job: A Study of Contacts and Careers"*, Harvard University Press, Cambridge, MA.

Hamilton, B. H.: 2000, Does Entrepreneurship Pay? An Empirical Analysis of the Returns to Self-Employment, *Journal of Political Economy* **108**(3), 604–631.

Heckman, J. J.: 1979, Sample Selection Bias as a Specification Error, *Econometrica* **47**(1).

Jacobson, L. S., LaLonde, R. J. and Sullivan, D. G.: 1993, Earnings Losses of Displaced Workers, *American Economic Review* **84**(4), 685–709.

Kletzer, L.: 1998, Job Displacement, *Journal of Economic Perspectives* **12**(1), 115–136.

Kuhn, P. J.: 2002, *Loosing Work Moving On: Worker Displacement in International Perspective*, W.E. Upjohn Institute of Employment Research, Klaamazoo, Michigan.

Lancaster, T.: 1990, *"The Econometric Analysis of Transition Data"*, Cambridge University Press, Cambridge.

Lancaster, T. and Nickell, S.: 1980, The Analysis of Re-Employment Probabilities for the Unemployed, *Journal of the Royal Statistical Society - Series A* **143**(2), 141–165.

Meyer, B. D.: 1990, Unemployment Insurance and Unemployment Spells, *Econometrica* **58**(4), 757–782.

Murphy, T.: 1996, A Piecewise-Constant Hazard-Rate Model for the Duration of Unemployement in Single-Interview Samples of the Stock of Employed, *Economic Letters* **51**(2), 141–165.

Neal, D.: 1995, Industry-Specific Human Capital: Evidence from Displaced Workers, *Journal of Labor Economics* **13**(4), 653–677.

Parsons, D. O.: 1972, Specific Human Capital: An Application to Quit Rates and Layoff Rates, *Journal of Political Economy* **80**(6), 1120–1143.

Pfann, G. A. and Palm, F. C.: 1993, Asymmetric Adjustment Costs in Nonlinear Labour Demand Models for the Manufacturing Sectors in the Netherlands and the UK, *Review of Economic Studies* **60**(2), 397–412.

Postel-Vinay, F. and Robin, J.-P.: 2002, Wage Dispersion with Worker and Employer Heterogeneity, *Econometrica* **70**(6), 2295–2350.

Rees, A.: 1966, Information Networks in Labor Markets, *American Economic Review* **56**(1/2).

Ruhm, C.: 1991, Are Workers Permanently Scarred by Job Displacements?, *American Economic Review* **81**(1), 319–324.

Topel, R.: 1990, Specific Capital and Unemployment: Measuring the Costs and Consequences of Job Loss, *Carnegie Rochester Conference Series in Public Policy* **33**, 181–214.

Tables

Table 1: Composition of Fokker Workforce and Survey Population at the Time of the Bankruptcy

	N	%
Displaced Workers	3991	70.71
Bankruptcy trustees	700	12.40
Fokker Aviation B.V.	953	16.89
Total	5644	100.00
Pilot	100	.
Other Workers involved in the development of the Survey	38	.
Survey Population	5506	.

Table 2: Survival Analysis: Timing of First Employment after Displacement

Weibull Proportional Hazard	Coeff.	s.d.	z	p
Weeks of UI remaining: (0,4)	0.586	0.095	6.17	0.000
Weeks of UI remaining: [4,8)	-0.307	0.160	-1.93	0.054
Weeks of UI remaining: [8,12)	0.089	0.130	0.69	0.490
Weeks of UI remaining: [12,26)	0.104	0.019	5.52	0.000
Weeks of UI remaining: [26,∞]	0.017	0.001	12.62	0.000
Firm Tenure	-0.064	0.019	-3.41	0.001
Firm Tenure^2 /1000	0.833	0.480	1.73	0.083
Hierarchy Tenure	-0.001	0.001	-0.53	0.596
Hierarchy Tenure^2 /1000	0.001	0.002	0.33	0.745
Job Tenure	0.000	0.001	0.31	0.760
Job Tenure^2 /1000	0.000	0.002	0.20	0.843
Number of Internal Trainings	-0.007	0.009	-0.79	0.429
Number of External Trainings	-0.003	0.026	-0.11	0.913
Job Activity: Sales	-0.321	0.176	-1.83	0.068
Job Activity: R & D	-0.333	0.157	-2.12	0.034
Job Activity: Production Preparation	-0.245	0.159	-1.54	0.124
Job Activity: Production Planning	-0.128	0.169	-0.76	0.449
Job Activity: Production	-0.054	0.153	-0.35	0.724
Job Activity: Support	0.041	0.199	0.21	0.837
Job Activity: Human Resources	-0.075	0.212	-0.35	0.724
Job Activity: Quality Control	-0.100	0.183	-0.05	0.956
Job Activity: Management	-0.433	0.191	-2.27	0.023
Hierarchical Level 2	0.186	0.111	1.68	0.093
Hierarchical Level 3	0.437	0.133	3.28	0.001
Hierarchical Level 4	0.317	0.139	2.28	0.022
Hierarchical Level 5	0.516	0.160	3.23	0.001
Hierarchical Level 6	0.717	0.179	4.01	0.000
Hierarchical Level 7	0.817	0.263	2.38	0.017
Hierarchical Level 8	0.741	0.263	3.11	0.002
Idiosyncratic Ability	0.458	0.282	1.63	0.104
WAO-%	-0.006	0.003	-1.96	0.050
$1/\ln\alpha$	0.604	0.033	18.59	0.000
$1/\ln\upsilon$	-3.203	0.993	-3.22	0.001
Observations	1610			

Notes: Weibull proportional hazard model with gamma frailty. The hazard is specified as $\upsilon \cdot \alpha t^{\alpha-1} \exp(\beta_0 + X\beta)$. Where υ is assumed to follow a gamma distribution and α is the coefficient of the Weibull distribution. Failure event is the timing of first employment past the bankruptcy for all displaced workers. We control also for plant location and evaluation scores, age and education. Further we include dummies for gender and for marital status. Hierarchical levels 1 to 3 are blue collar production workers, 4-8 are white collar workers. Level 8 corresponds to a hierarchical level below the top-management.

Table 3: Estimates of Wage Losses

(a) Pre-Displacement Variables

	Marg. Effect	s.e.	t	p	Mean
Firm Tenure	-0.003	0.003	-1.07	0.287	15.286
Firm Tenure^2 /1000	0.052	0.085	0.61	0.543	0.300
Hierarchy Tenure	0.000	0.000	0.72	0.472	335.086
Hierarchy Tenure^2 /1000	-0.000	0.000	-1.03	0.304	136.805
Job Tenure	-0.000	0.000	-0.15	0.877	230.559
Job Tenure^2 /1000	0.000	0.000	0.40	0.689	77.705
Number of Internal Trainings	-0.001	0.002	-0.84	0.400	2.232
Number of External Trainings	-0.004	0.005	-0.74	0.458	0.579
Job Activity: Administration	– Reference –				0.067
Job Activity: Sales	-0.010	0.031	-0.32	0.749	0.070
Job Activity: R & D	-0.071	0.030	-2.37	0.018	0.188
Job Activity: Production Preparation	-0.070	0.030	-2.29	0.022	0.121
Job Activity: Production Planning	-0.046	0.032	-1.44	0.151	0.068
Job Activity: Production	-0.063	0.030	-2.12	0.034	0.269
Job Activity: Support	-0.061	0.038	-1.61	0.108	0.038
Job Activity: Human Resources	0.000	0.038	0.01	0.991	0.031
Job Activity: Quality Control	-0.083	0.035	-2.38	0.017	0.070
Job Activity: Management	-0.004	0.030	-0.13	0.893	0.078
Hierarchical Level 1	– Reference –				0.469
Hierarchical Level 2	-0.005	0.022	-0.21	0.833	0.127
Hierarchical Level 3	0.025	0.026	0.96	0.336	0.113
Hierarchical Level 4	0.022	0.028	0.79	0.432	0.173
Hierarchical Level 5	0.054	0.032	1.71	0.088	0.111
Hierarchical Level 6	0.031	0.035	0.86	0.389	0.090
Hierarchical Level 7	-0.037	0.049	-0.76	0.445	0.022
Hierarchical Level 8	0.053	0.053	1.00	0.316	0.022
Number of lateral movements	0.032	0.012	2.76	0.006	0.236
Evaluation: Unsatisfactory	-0.254	0.051	-4.94	0.000	0.000
Evaluation: Good	– Reference –				0.660
Evaluation: Very Good	0.029	0.015	1.95	0.051	0.016
Evaluation: Excellent	-0.001	0.003	-0.19	0.846	0.324
Idiosyncratic Ability	-0.011	0.004	-2.55	0.011	0.084
WAO - %	0.001	0.000	4.90	0.000	2.581

(b) Post-Displacement Variables

	Marg. Effect	s.e.	t	p	Mean
New Job: Much more responsibility	0.011	0.018	0.60	0.548	0.123
New Job: More responsibility	0.016	0.014	1.14	0.253	0.240
New Job: Same responsibility	– Reference –				0.313
New Job: Less responsibility	-0.048	0.014	-3.31	0.001	0.210
New Job: Much less responsibility	-0.101	0.018	-5.52	0.000	0.114
Not Industry	– Reference –				0.571
Other Industry	0.020	0.012	1.61	0.107	0.269
Aircraft Industry	0.042	0.015	2.69	0.007	0.160
Technical knowledge and job experience necessary	0.027	0.017	1.64	0.100	0.208
Technical knowledge necessary	0.063	0.027	2.32	0.020	0.041
Job experience necessary	0.045	0.015	3.02	0.003	0.355
Technical knowledge & experience useful	– Reference –				0.212
Neither experience nor technical knowledge	-0.037	0.017	-2.18	0.029	0.184
$\hat{\rho}$	0.018	0.135			
Observations	1641				
Predicted Δ log(W)	-0.119				

Note: Sample consists of all workers that were neither employed by the bankruptcy trustees nor by Aviation. Age, education, plant location, gender, and marital status are held constant in this regression.

Table 4: Wage Losses Three Years after Displacement

	Marg. Effect	s.e.	t	p	X
Months unemployed	-0.007	0.001	-6.49	0.000	5.026
Number of employers: 0	-0.023	0.024	-0.96	0.336	0.179
Number of employers: 2	0.034	0.013	2.55	0.011	0.278
Number of employers: 3	0.043	0.019	2.26	0.024	0.092
Number of employers: 4	0.070	0.031	2.27	0.023	0.032
Number of employers: > 4	0.012	0.039	0.30	0.763	0.020
Idiosyncratic Ability	-0.336	0.054	-6.25	0.000	0.000
Observations		1574			
Predicted Δ log(W)		-0.025			

Note: We control also for age, firm, hierarchical and job tenure, as well as number of trainings, job activity, hierarchical level, lateral movements, new job responsibility, education, required knowledge, gender and marital status.

Table 5: Avg. Salary and number of Matches per 3 month period

Time	tp 1	tp 2	tp 3	tp 4			time period 5				
period	$< 6/96$	$< 9/96$	$< 12/96$	$< 3/97$	$< 6/97$	$< 9/97$	$< 12/97$	$< 3/98$	$< 6/98$	$< 9/98$	$\geq 9/98$
matches	835	393	191	68	58	43	23	20	15	8	25
avg salaris	5845	5237	5177	4964	4896	4120	3780	4225	3637	3543	4353
at risk	1679	844	451	260	192	134	91	68	48	33	25

Notes: The first three time periods refer to a three month period. I.e. $< 6/96$ refers to the period from March 1996 to June 1996.
The period *geq* 9/98 refers to the period September 1998 until the 1st of April 1999, when the survey was conducted.

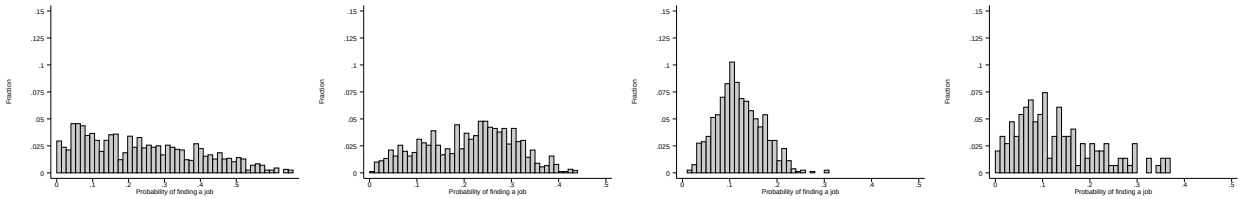
Table 6: Piece-wise Constant Hazard Model

	Coeff.	s.d.	z	p
t1	-7.262	0.296	-24.53	0.000
t2	-7.532	0.299	-25.20	0.000
t3	-8.789	0.326	-26.97	0.000
t4	-6.363	0.293	-21.68	0.000
t5	-5.700	0.279	-20.40	0.000
t1 * relative wage position	0.113	0.107	1.05	0.293
t2 * relative wage position	1.451	0.340	4.27	0.000
t3 * relative wage position	6.804	0.591	11.50	0.000
t4 * relative wage position	-0.776	1.025	-0.76	0.449
t5 * relative wage position	0.301	0.918	0.33	0.743
Idiosyncratic Ability	0.484	0.280	1.73	0.084
$1/\ln \upsilon$	-13.881	185.741	-0.07	0.940
Subjects	1613			

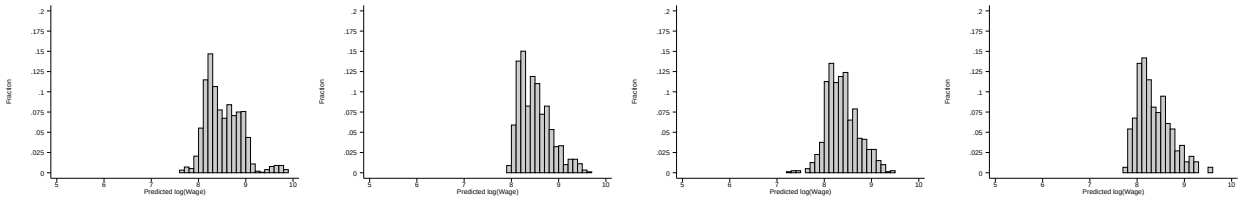
Note: t1 to t5 represent the time specific intercepts. We also control for all other variables that are used in the first duration estimation.

Figure 1: Development of Job Expectations, Predicted Wages and Wage Expectations

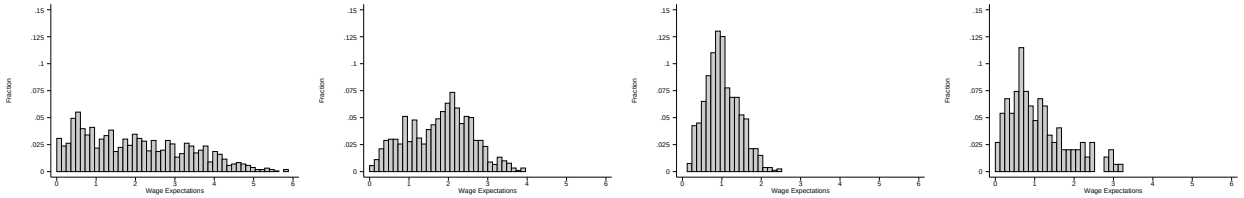
Time Period 2: 6/96 - 8/96 Time Period 3: 9/96 - 11/96 Time Period 4: 12/96 - 8/97 Time Period 5: 9/97 - 3/99



Probability of Finding a Job



Predicted Wages



Wage Expectations

Appendix A

Fokker Survey Non-Response Analysis

We addressed the non-response issue as to make sure that the results of the survey are reliable, verifiable, and representative of displaced workers. Two methods are used: Firstly, we conducted a non-response follow up among 200 randomly selected non-respondents using a core question approach. Secondly, we used weighted as well as unweighted estimations using information of non-respondents from the personnel files. The idea of asking a limited number of core questions for a follow up, was first suggested by Bethlehem and Kersten (1986) as a method to distinguish between the group of non-respondents who are simply unwilling to provide the detailed answers asked for in general or specific surveys, and those unwilling to participate for reasons related to the survey specifically. To learn about possible non-random selection a limited number of core questions were asked to non-respondents by means of telephone interviews. Given the information we already had about the respondents and non-respondents from the personnel files, the core questions should be sufficient for identifying non-response bias. In Table A.1 the results are given from the non-response follow up. We find that the labor market status is comparable between the respondents and the non-respondents. We conclude that the non-response is randomly distributed with respect to the (un)employment status.

The second test examines the effects of known variables of both respondents

and non-respondents on the probability of response. To identify the compositional differences between respondents and non-respondents we used a simple Probit including all variables from the personnel files to examine the differences between the respondents and the non-respondents. Having predicted a probability of survey response allowed us to post-stratify the sample outcomes with the inverse of the individual's response probability.

From the core question approach we concluded that the group of non-respondents seems to match the group of respondents with respect to the labor market status. The additional examination of non-response behavior showed that some variables[8] significantly predicted non-response. This implies that non-response was not random. As the weighted estimation differ very little from the unweighted ones, we report the unweighted results only.

[8]Variables that turned out significant were: tenure of 25-29 years and more than 30 years, married, female and salary scales 9-11 turned out to lower non-response, whereas age group 55+, low evaluation score, as well as jobs in R&D, production planning and being selected for Fokker Aviation increased non-response.

Table A.1: Employment status in 1999 – Response vs. Non-response

	Core Question Approach	
	Non-Response Follow up	Fokker Survey
Employed	80.84	80.82
Unemployed	4.54	4.52
Self-Employed	3.08	2.50
Other	11.54	11.98
N	200	5506
Response	84.5%	41.4%

Appendix B

The econometric specification of the reservation wage updating model

Following Lancaster (1990) we divide the observation period into M intervals, let $c_1, c_2, ..., c_{M-1}$ denote the border of the interval. The hazard of a person i for interval m can then be written as

$$\theta_i(t) = \mu_i e^{\lambda_m},\ c_{m-1} \leq t < c_m,\ m = 1, 2, ..., M \tag{10}$$

Let $\mu_i = \mu(X_i) = \exp(X_i\gamma)$ and let us define an indicator d_m such that,

$$d_m(t) = \begin{cases} 1 & \text{if } c_{m-1} \leq t < c_m, \\ 0 & \text{otherwise} \end{cases}$$

This indicator identifies the interval into which t falls. Let us further define $D_m(t) = \prod_{j=1}^{m}[1 - d_j(t)],\ m = 1, 2, ..., M-1;\ D_0(t) = 1$. The variable simply indicates whether t falls at or after c_m.

Given possible heterogeneity due to some unobserved characteristics in the true X^*, we follow Lancaster and Nickell (1980) and Murphy (1996) in assuming that the heterogeneity can be captured in the single random variable υ with a distribution of function $H(\upsilon)$ and density $h(\upsilon)$. This is assumed

multiplicative in the hazard which thus becomes:

$$\theta_i(X_i^*, t) = \upsilon\mu_i \cdot e^{\lambda_m} \tag{11}$$

The hazard rate of person i for all M periods then becomes:

$$\theta_i(X_i^*, t) = \upsilon\mu_i \exp\left\{\sum_{m=1}^{M} \lambda_m d_{im}\right\} \tag{12}$$

The Survivor function can be written to be:

$$\begin{aligned} S(t) &= \exp\{-\upsilon \int_0^t \theta_i(t)\} \\ &= \{\mu_i \sum_{m=1}^{M} e^{\lambda_m} d_{im} e^{\lambda_m}[(t_i - c_{m-1})d_{im} + (c_m - c_{m-1})D_{im}]\}^{\upsilon} \end{aligned} \tag{13}$$

The likelihood contribution of person i who is leaving unemployment or censored at t_i is

$$L_i = \delta_i \log \mu_i + \delta_i \log \upsilon + \delta_i \sum_{m=1}^{M} d_{im}\lambda_m - \mu_i \upsilon \sum_{m=1}^{M} e^{\lambda_m}[(t_i - c_{m-1})d_{im} + (c_m - c_{m-1})D_{im}] \tag{14}$$

With δ being an indicator variable that takes on the value one if the observation is not censored and zero otherwise. In order to write the log-likelihood more compactly, we define

$$T_{im} = [(t_i - c_{m-1})d_{im} + (c_m - c_{m-1})D_{im}]$$

Then we can write the total log likelihood by summing over all N observations.

$$L = \sum_{m=1}^{M} [\delta_i \log \mu_i + \delta_i \log \upsilon] + \sum_{m=1}^{M} \lambda_m \sum_{i=1}^{N} d_{im}\delta_i - \sum_{m=1}^{M} e^{\lambda_m} \sum_{i=1}^{N} \upsilon\mu_i \cdot T_{im} \quad (15)$$