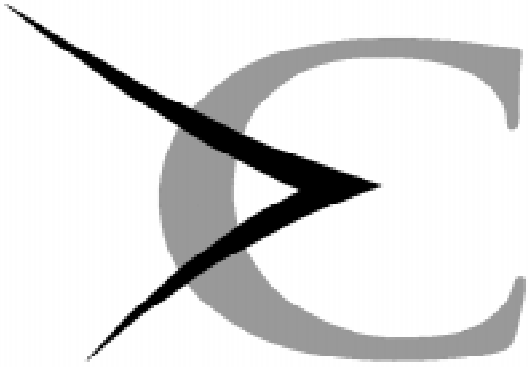

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Sector-Specific Training and Mobility in Germany

Lars Vilhuber

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Sector Specific Training and Mobility in Germany*

Lars Vilhuber†

Résumé / Abstract

Cet article étudie la mobilité des travailleurs allemands à la lumière d'un modèle de capital humain dont la spécificité est sectorielle. En outre, j'utilise et décris des données peu utilisées sur la formation formelle ayant lieu après la fin d'un apprentissage. Comparativement aux États-Unis, un plus grand nombre de travailleurs suit une formation annuellement, et ce en dépit d'une incidence élévée d'apprentissage précédent. Tandis que plusieurs autres études font uniquement une distinction entre capital humain spécifique à une seule firme et capital humain général, je montre que les travailleurs allemands ont une plus grande probabilité de trouver un emploi dans un secteur s'ils ont suivi une formation formelle dans ce secteur. Ce résultat n'est cohérent ni avec la présence de capital humain spécifique à une seule firme, ni avec du capital humain complètement général. Conjointement avec des résultats semblables pour des travailleurs américains, il suggère l'importance du capital humain spécifique à l'industrie. Par ailleurs, l'effet de la formation sur la mobilité semble sensible à l'état de la conjoncture, suggérant une relation entre offre et demande plus complexe que celle décrite par la plupart des modèles théoriques.

This article studies mobility patterns of German workers in light of a model of sector-specific human capital. Furthermore, I employ and describe little-used data on continuous on-the-job training occuring after apprenticeships. Results are presented describing the incidence and duration of continuous training. Continuous training is quite common, depite the high incidence of apprenticeships which precedes this part of a worker's career. Most previous studies have only distinguished between firm-specific and general human capital, generally concluding that training was general. Inconsistent with those conclusions, I show that German men are more likely to find a job within the same sector if they have received continuous training in that sector. These results are similar to results obtained for young U.S. workers, and suggest that sector-specific capital is an important feature of very different labor markets. Furthermore, the results suggest that the observed effect of training on mobility is sensitive to the state of the business cycle, indicating a more complex interaction between supply and demand that most theoretical models allow for.

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* Corresponding Author: Lars Vilhuber, CIRANO, 2020 University Street, 25th floor, Montréal, Qc, Canada H3A 2A5 Tel: (514) 985-4000 Fax: (514) 985-4039 e-mail: vilhuber@yorku.ca
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JEL : J24, J41, J62, P52

1 Introduction

The "dual model" of German apprenticeship training is widely admired and often cited as a model of on-the-job training (Hilton 1991, Muszynski and Wolfe 1989). Less attention has been paid to continuous on-the-job training, received after the end of an apprenticeship. Nevertheless, post-apprenticeship training is quite common in Germany. In cross sectional analysis, 2.05 percent of all full-time workers are in some sort of non-apprenticeship training.[1] This compares to an incidence of 2.14 percent in the United States, based on data from the National Longitudinal Survey of Youth (NLSY), the data source most frequently used to study on-the-job training due to it's extensive questioning on the subject.[2] Thus, even after apprenticeships are absolved, Germans seem to train about as much as Americans.

Previous work has focused on apprenticeships, whether from an institutional perspective (Soskice 1994) or from a quantitative perspective (see f.i. Winkelmann (1994) and Werwatz (1996)). Some of the same authors have also looked at mobility after apprenticeship (Winkelmann 1996, Werwatz 1997). Work on continuous training in Germany is more seldom. Pischke (1996) has looked at continuous training in Germany using an earlier version of the German Socio-Economic Panel (GSOEP). He finds only small wage effects associated with continuous training, but did not consider mobility. Pannenberg (1997) has looked at the question of financing of training and found that sharing of returns does not occur in the case of German on-the-job training. Both Pannenberg (1997) and Büchel and Pannenberg (1994) find that continuous training is positively correlated with promotions, so that some of the returns may accrue in form of promotions rather than direct salary increases. The present paper complements the previous work by presenting results from an updated version of the GSOEP data, and extends the analysis to the industry mobility patterns associated with further training.

In previous work using the NLSY, I have shown that the mobility patterns associated with the stock of on-the-job training are consistent with the presence of industry-specific, but not firm-specific human capital. However, since apprenticeships are less prevalent in the United States, this conclusion may not carry over to Germany. Having acquired a higher initial stock of human capital through apprenticeships, the mo-

[1] Author's computations based on 1984-1995 waves of German Socio-Economic Panel (GSOEP).

[2] Author's computations based on 1979-1992 sample of NLSY. The NLSY sample has a lower average age, and the computed incidence number includes workers in apprenticeships.

bility decisions of German workers may be less affected by subsequent human capital acquisition. In this paper, I exploit the longitudinal nature of the GSOEP to study the transition patterns related to incidence and duration of on-the-job training. These patterns allow inference as to the specificity of the human capital thus formed, whether firm-specific, sector-specific, or, as most previous authors have argued, general. Results are presented for Germany, and compared with the results obtained for North American workers.

2 A Model of Sectoral Capital and Mobility

Human capital theory, though primarily interested in the wage and its remuneration of human capital, has implications as to the mobility of workers. This obviously depends on the degree of specificity of the human capital acquired, either through formal or informal training. Most work based on human capital theory has used a dichotomy between firm-specific and universally-general capital formation. Recent empirical work on the wage effects of industry tenure (Neal 1995, Parent 1995) has shown that this stark dichotomy may be too imprecise. Already Gary Becker had in mind that human capital could be of use elsewhere, but not necessarily by everybody:

> " *General training is useful in many firms besides those providing it; for example, a machinist trained in the army finds his skills of value in steel and aircraft firms, and a doctor trained at one hospital finds his skills useful at other hospitals.*
>
> (Becker 1964,1993, pg. 33)

Hence, some training will be of use only to a restricted subset of all firms in the economy, and will therefore be less then completely general. On the other hand, there may well exist training which is truly of use only to the training firm, and other training, one has only to think of word processing skills, that will be of use to such a large set of firms that it can truly be said to be completely general.

A model of sector-specific human capital

To fix ideas, consider the following model. It is a model of jobs as inspection goods (Jovanovic 1979), coupled with the usual assumption of an increase in marginal product due to human capital formation (Becker

1964,1993). There is no active job search, but job offers arrive at constant rates, which may differ across sectors.[3] There are two sectors. By convention, the worker is initially employed in sector 1, receiving a (log) wage $w_0 = \gamma(k)$, a positive function of the stock of human capital (k). For simplicity, we assume a linear function, $\gamma(k) = \gamma k$. The degree of transferability of human capital to other firms and sectors is denoted by α_i, $i = 1, 2$, and without loss of generality, α_i are either unity or zero ($\alpha_i \in \{0, 1\}$. The firm pays for the training irrespective of its specificity, and the worker's wage is increasing in k: $\gamma > 0$. Offers $w_i(k)$ arrive at a constant rate r. A fraction q of offers comes from sector 2. Both sectors are competitive, and in each sector, (log) wage offers (the value of worker-firm matches) are normally distributed with mean $\gamma k \alpha_i$ and variance $\sigma = 1$.[4] The worker will switch firms and/or sectors if he receives a wage offer $w_i(k) > w_0(k)$, which occurs with probability $1 - \Phi_i(w_0(k) - w_i(k)) = F_i(w_0)$. Abstracting from ties, the probability of a sectoral move per period, the inter-sectoral transition intensity, is $\theta_2(k) = r \cdot q \cdot F_2(w_0)$. The intra-sectoral transition intensity is defined equivalently as $\theta_1(k) = r \cdot (1 - q) \cdot F_1(w_0)$. The hazard function $\lambda(k)$ is simply the sum of the transition intensities. The probability of a sectoral move conditional on leaving the current job is $M_2(k) = \theta_2/(\theta_1 + \theta_2) = qF_2/[(1 - q)F_1 + qF_2]$. Suppose that initially $k = 0$, hence all distributions have the same mean.

If training, the process of human capital acquisition, is firm-specific, then $\alpha_1 = \alpha_2 = 0$. Industry-specific capital is the case where $\alpha_1 = 1$ and $\alpha_2 = 0$: training is perfectly portable within the same sector, but not across sectors. Finally, general training is portable across sectors, hence $\alpha_1 = \alpha_2 = 1$.

Now consider the acquisition of dk units of human capital through training. Initially, all distributions have mean zero, $\theta_2(0) = r \cdot q/2$, $\theta_1(0) = r \cdot (1-q)/2$, $\lambda(0) = r/2$, and $M_2 = rq$. If training is firm-specific, then $\partial F_i(w_0)/\partial k < 0$ for $i = 1, 2$. Both transition intensities decline, and so does the hazard. This is so because the firm will share part of the return on human capital with the worker[5] and match most outside wage offers. The conditional probability of a sectoral move $M_2(k)$, however, is unchanged, since the desirability of wage offers from both sectors relative to the current wage decline in the same manner.

If training is general, then both transitions intensities remain un-

[3] Similar in spirit, but without the emphasis on mobility, is (Stevens 1994).

[4] I assume that the variance is equal across sectors. This is a sufficient condition, but not necessary for our results to hold.

[5] This was suggested by Becker (1964,1993) and formalized by Hashimoto (1981).

changed, and so does the overall hazard.[6] Furthermore, as in the firm-specific case, $\partial M_2(k)/k = 0$, since the desirability of wage offers from both sectors increase in the same manner.

However, if training is industry specific, the transition intensity to Sector 2 decreases, i.e. $\partial\theta_2(k)/\partial k < 0$, but the transition intensity to the same sector remains unchanged, $\partial\theta_1(k)/\partial k = 0$, since the mean productivity for other firms in the same sector increases by the same amount as for the present firm. This implies that the conditional probability of a sectoral move $M_2(k)$ decreases, since $sign(\partial M_2(k)/\partial k) = sign(\theta_1\partial\theta_2/k - \theta_2\partial\theta_1/\partial k) < 0$. Note that the hazard λ also declines, although by less than in the firm-specific case.

Thus, it is possible to distinguish the three cases by estimating the conditional probability of a sectoral move. A reduction in this probability following the acquisition of human capital is inconsistent with both firm-specific and general human capital.

The model can easily be extended to include non-employment as a third sector. "Wage offers" from the non-employment "sector" can be interpreted as shocks to the reservation wage. Assume that $w_3(k) = 0$, i.e. human capital has no effect on leisure. The hazard is now defined as the sum over all three transition intensities. Define $M_{job} = (\theta_1 + \theta_2)/\lambda$, the conditional probability of finding a job. Under the above assumptions, θ_3 always declines in k. Hence, for $\alpha_1 = \alpha_2 = 0$, $\partial M_{job}/\partial k = 0$, but for the other two cases, $\partial M_{job}/\partial k > 0$. This is another way of saying that (conditional) labor force attachment increases with training if training is not firm-specific, but remains unchanged in the case of more general training. M_2 is now reinterpreted as the probability of a sectoral change, conditional on being employed in the next period.

Related findings

Most previous empirical studies, most of which regarded U.S. workers, have concentrated on the effects of training on wages and the propensity to change jobs without distinguishing occupational and sectoral changes. On-the-job training (OJT) increases wages with the current employer. As we have seen, this could be consistent with both general and firm-specific human capital. The literature is not clear on whether employers remunerate OJT received from previous employers. Lynch (1992b) finds that these returns are nil, whereas Parent (forthcoming) and Loewenstein and Spletzer (1998), using more representative samples and more

[6] Note that in this model, everything is observable. Any informational rent obtained by the employer may lead to different predictions (Acemoglu and Pischke 1998).

elaborate techniques, find that returns to previously obtained OJT are as high as for training received with the current firm, indicating that training is of a general nature. However, OJT does not seem to be paid for by the employee through reduced starting wages (Barron, Berger and Black 1997, Loewenstein and Spletzer 1998, Veum 1995), which is consistent with the idea that human capital thus formed is of a (firm-)specific nature, i.e. the employer finances training because he or she reaps the returns.

Only a few studies have used duration analysis to look at the mobility patterns associated with training. Estimates of duration models have shown that the probability of separation from the current employer is reduced, conditional on having received some OJT (Lynch 1992a, Parent forthcoming). Combined with the reported results on the wage effects of training, this is usually interpreted as evidence for the presence of some firm-specific component to formal training, or at least in contradiction with the interpretation of training as portable across employers. In contrast, Veum (1997) finds no effect of on-the-job training on tenure, and Vilhuber (1997) argues that any previously measured tenure effect is due to inference based on mismeasurement of the dependent variable, since measured tenure includes the non-productive time spent in (formal) training programs, but the variable of interest is productive time.

Few previous studies, and none in the training literature, have considered the distinction between intra-sectoral mobility and cross-sectoral mobility. As mentioned earlier, Neal (1995) and Parent (1995) have found evidence that the relevant distinction concerning *informal* human capital as conventionally measured by experience or tenure is sectoral. Neal (1995) comes closest in spirit to the present paper, estimating the wage returns to pre-displacement tenure for industry stayers and industry changers, but does not estimate the effect of human capital acquisition on the probability of a sectoral change. Parent (1995), uses wage regressions to show that industry tenure increases wages, and controlling for industry tenure, the wage effect of firm tenure is negligeable. Neal (1996) addresses the question of complexity of job changes. He finds evidence that the propensity for cross-sectoral changes decreases with industry experience, but does not relate these changes to training variables. Thomas (1996) estimates a parametric model of sectoral mobility for persons experiencing unemployment, distinguishing exits from jobs only as to voluntary quits or involuntary job losses and neglecting direct job-to-job transitions. He finds that the probability of changing sectors increases with the duration of unemployment. Furthermore, tenure on the previous job increases the duration of unemployment.

In Vilhuber (1997), I have estimated mobility models using the NLSY,

and have found results consistent with the model of sector-specific training outlined earlier. These results will be reviewed in Section 6 in combination with the results of this paper.

The rest of the paper is structured as follows. Section 3 describes the structure of the training data in the GSOEP, and outlines the estimation strategy of the model just described. Section 4 describes the sample used, as well as some descriptive statistics as to training incidence and duration. Section 5 reports results from the estimation of the model. Last but not least, Section 6 briefly describes comparable results from U.S. data, and concludes.

3 Data and Estimation Strategy

In this paper, I use data from the German Socio-Economic Panel (GSOEP) for the years 1988-1990 and 1992-1994. In 1989 and 1993, the GSOEP asked a series of questions on "Fortbildung" (*further*, or *continuous* training) of its respondents. Here, I use information on training incidence, duration (in six increasingly broad categories), and training intensity (hours per week). This paper only considers West Germans, due in part to the particularities and differences in the former East German training system, and to the oversampling of the foreign-born population.[7] I merge this information with, on one hand, job market data relating to Period 1, defined as starting on January 1, 1988 (resp. 1992), and ending with the interviewee's date of interview in 1989 (1993), and on the other hand, labor market activity at the end of Period 2, at the time of the 1990 (1994) interviews. In this section, I will briefly outline the available data and its constraints, and the ensuing estimation strategy.

The GSOEP questionnaire methodology puts a number of restrictions on the data. First, respondents are asked about training which occured in the last three years, but the questions are asked in two interviews separated by four years. Thus, even if information on every training spell within those three years were available, it would not be possible to construct a complete history of training.[8] Second, of those training spells having occured within the three-year time frame, only the three most recent spells are recorded. About 50 percent of respondents (35 percent in the selected subsample) who say they received some training in the last three years received more than three spells during that period.

[7] Weighting the foreign-born sample would have been an alternative.

[8] This constraint affects the NLSY data to a lesser degree as well, see Vilhuber (1997). However, since the NLSY training questions are asked every year, the constraints are less restrictive.

Thus, this is a major constraint.[9]

Third, information on financing and the organizing entity are only available for one of the training spells. Again, in the sample used here, the information is lacking for about half of all training spells. This is particularly important, since I am interested in on-the-job training. I circumvent this problem by assuming that training was on-the-job if it occurred concurrently with a job spell, as outlined below.

3.1 Sample construction

To take these restrictions into account, the following sample selection and estimation strategy is adopted in this paper. Any individual having worked within Period 1 is chosen for the present sample. For these workers, I consider only training having occured within the same time frame to aleviate the problem of incompleteness. This specification is chosen because the questions concerning employment changes use the same time frame.[10]

Information from the second interview, at the end of Period 2, is merged with the sample, allowing identification of four possible states an individual can be observed in and three possible transitions. The four states are: employment with the same employer, employment with a different employer in the same industry (industry stayers), employment in a different industry with a different employer (industry switchers), and non-employment. Using the model put forward in Section 2, this data structure allows us to estimate the probability of a sectoral change in Period 2, conditional on employment in Period 1.

The final sample comprises male blue- and white-collar workers between 18 and 65 years of age having worked during Period 1 and still present in the data in Period 2. Workers are excluded if working in either in agriculture, fishing, or unclassified service industries, primarily because of small cell sizes. The resultant sample comprises about 5200 individuals, of which slightly more than a fifth have received some type of training in Period 1. However, 76 percent never change employers, and only slightly more than eight percent (245 men and 187 women) are with a different employer in period 2. The small sample sizes involved may thus prohibit generalizations.

As previously pointed out, information on who actually organizes and/or pays for the respective training is available for only a subset of spells (the "most important" one). After the above sample selection,

[9] Again, this affects NLSY data as well. About 2.2 percent of respondents report receiving four training spells longer than a week in post-1987 NLSY data.

[10] JP23

the information is available for only about 50 percent of the sample. I thus circumvent this problem by verifying whether training occurred simultaneously with an employment spell, and if so, defining that training spell as being "on-the-job". To some degree, this strategy could include training spells undertaken in preparation of a career change, but outside of work or without sanction by the employer. Since of those stating an organizer, 70 percent quote their employer or an employers' association as the organizer of their training, and another 4 percent a manufacturer, the simplification adopted here may not be too restrictive. In fact, less than one percent of all training spells in my sample (6 training spells) cannot be associated with a specific employer, and thus all are considered "formal on-the-job training".

3.2 Econometric specification

The econometric models are fairly straightforward.[11] The choice of destination as outlined in Section 2 is modeled as a multinomial logit, where the marginal probability of destination m, π_m is modeled as

$$\pi_m = \frac{\exp(-x\beta_m)}{\sum_{j=1}^{K} \exp(-x\beta_j)} \tag{1}$$

where x are covariates at their Period 1 values, and destinations $m = 1, 2, 3$ are a job in the same industry, a job in a different industry, and non-employment, respectively. As I show in Vilhuber (1997), this specification follows from a proportional intensity specification of a duration model with multiple destinations:[12]

$$\frac{\theta_m(t;x)}{\lambda(t;x)} = \frac{k_{2m}(x;\beta_m)}{\sum_{j=1}^{M} k_{2j}(x;\beta_m)} \quad = \quad \mu_m \qquad \forall k \tag{2}$$

where the transition intensity to state m is defined as

$$\theta_m(t) = k_1(t,x)k_{2m}(x;\beta_m) \tag{3}$$

and the hazard $\lambda(t;x) = \sum_{j=1}^{M} \theta_j(t)$.

Note (after some manipulations) that the sign of M_2, the probability of a sectoral move conditional on separation, can be directly computed

[11] For more details, see Maddala (1983).

[12] It implies that the time-dependent components of the hazard are common to all destinations. Vilhuber (1997) shows that this specification may be inappropriate, and proposes a test against the alternative of a competing risks model. In the present context, lack of data preempts that test.

as the sign of the difference between the appropriate elements in vectors β_1 and β_2. The sign of M_{job} depends on the relative magnitudes of θ_1 and θ_2 in a three-state model (conditional on separation), but can be approximated by a two-state logit choice between non-employment and employment.[13]

4 Some basic results

Post-apprenticeship training is quite common in Germany. Column 1 in Table 1 on page 24 reports tabulations from a series of cross-sections of workers taken from the GSOEP.[14] 2.05 percent of all workers are in on-the-job training while on full-time employment and not in apprenticeships. There is significant time-variation in this measure, varying from a low of 1.57 to highs of 2.56.[15] These numbers compare to an average rate of 2.19 percent in the U.S. National Longitudinal Survey of Youth, reported in Column 3. The NLSY sample, however, has a lower average age, and the above number includes workers on many type of training, not only more closely defined as on-the-job. In Columns 2 and 4, I adjust the sample selection and the definition of training to resemble each other even closer. In Column 3, only German workers who were between 19 and 27 at the time of the 1984 interview are included,[16], replicating the NLSY age structure of the same year. In Column 4, only American training spells that were organized at the workplace were counted. The difference is even more pronounced: 3.04 of the younger German population are in some sort of non-apprenticeship on-the-job training while working[17], whereas only 1.08 percent of the young Americans are in more closely defined on-the-job training. It would seem, contrary to expectations, that Germans train more than Americans, even after apprenticeships are excluded.

4.1 Sample description

Table 2 on page 25 reports means for the entire sample underlying this study, for those having left their Period 1 employer, and for those hav-

[13] For more details, see Vilhuber (1997).

[14] The definition of training here is not exactly comparable to the one used in the rest of the paper.

[15] The lows occur almost precisely in the years in which the more detailed training questions used in the rest of this paper were asked. If this is due to some response bias, then the other years will be over-estimates of true training activity.

[16] About 19 percent of the West German GSOEP sample satisfy this constraint.

[17] See Appendix A for more details on the questions used in both questionnaires.

ing received some training within Period 1. Movers tend to have lower income, but people having received training have higher income after training, though this is also true before training (see Table 9 on page 31). Movers also have a slightly lower incidence of training. In this sample, movers are younger and tend to have less labor market experience then the full sample. However, there are no signficant differences along these dimensions between the full sample and those having received some training.

Movers also have less family ties, whereas trained workers have more family ties as measured by family composition. This will also be discussed in more detail later.

With respect to the full sample and movers, trained workers have more (school) education and tend to have more professional degrees. This is also reflected in the higher percentage of trained workers who are still in the occupation they originally apprenticed in. To some extent, the jobs in which trained workers can be found are also more likely to require at least an apprenticeship as initial training, but require less training overall.

Turning to the characteristics of the training spells reported, I again distinguish between movers and the full sample in Table 3 on page 26. The groups are primarily distinguished in who initiated training and when training took place. Movers have a small tendency to undertake training on their own initiative, and to participate outside of regular working hours. They tend not to undertake training in order to keep up with new job requirements, though this is still by far the most frequent reason. Notice however the small sample sizes involved, which will restrict the analysis I undertake here.

4.2 Opinions on continuous training

West German workers have on average favorable opinions concerning the utility of continuous training, though this is not universal (see Table 4 on page 27). 65 percent find some utility to continuous training. The predominant reason, expressed one way or another, is that continuous training is useful to update knowledge, be it by adding new knowledge or revising old knowledge, closely followed by the utility of gaining new knowledge for new jobs.

Opinions are fairly split when asked what reasons might hinder participation in training. Whereas 45 percent of respondents to question A state that they would participate in training in order to improve job prospects, 40 percent of those answering the next question dispute that

training would increase job prospects.[18] Many seem to be either time-constrained or liquidity-constrained.

In participants' opinion, training is of a quite general nature. Of those workers having experienced some training within the last three years, nearly 67 percent state that the most important training received is either completely or to a large degree transferable to other jobs. As I will show in this paper, the subjective evaluation expressed here has objective foundings.

4.3 Financing and timing of training

Given this perceived generality of training, the extent to which employers financially contribute to continuous training appears surprising. Two thirds of all respondents report obtaining financing for the most important training spell, and the bulk of this financing comes from employers (Table 5 on page 28). Interestingly enough, as Table 6 on page 28 reports, individuals who received financing from their employer do not seem to evaluate their training as less transferable than those that received no financing at all. Most of the variation comes from workers being financed through other sources, but workers who do not get any financing at all seem less sanguine about transferability than workers financed by their employer. This apparent mystery prompts a look at financial assistance by category of organizing entity in Table 6 on page 29. With the exception of adult education centers ("Volkshochschulen") and unclassified other institutions, it is among employer-organized training that the proportion of non-financing is highest, putting doubt on what workers perceive as financing. Among those entities most closely related with the present job, 26.60 percent of respondents state not being financed, but if financed, nearly 97 percent get financing from their employer. One possibility is that workers might state that they do not receive any financing if no direct costs were incurred by the worker, although the company may be paying directly for the cost of the course. It thus seems safe to say that the vast majority of continuous training is paid for by the employer.

If the employer covers any overt financing, what about foregone productive time? Do workers obtain training during working hours, presumably implying continued wage payments, and does this differ by organizing entity? Table 6 on page 30 shows that it is again the non-typical

[18] Casting some doubt on the validity of these opinion polls, nearly 15 percent of those stating that they would participate in training in order to increase job prospects also state that they would not participate because training would not improve job prospects. Have these individuals participated in training and been disappointed?

training spell, organized by adult education centers and other organizations, which does not occur primarily during working hours. Of those spells organized by employer-related entities, more than 80 percent took place at least partially during working hours. However, these two non-typical categories account for only 6 percent of reported training spells.

Hence, a typical training spell, independent of who organizes it, is financed by the employer directly, and includes continued receipt of wage payments.

Thus, at this point, the question arises as to how transferable training is. The workers' evaluation points to a large degree of transferability, but at the time of the interview, this evaluation is largely hypothetical. On the other hand, firms incur substantial direct and indirect costs through workers participating in training. If training has no effect on tenure, then the riddle of why German firms pay for apprenticeship training (Acemoglu and Pischke 1998, Harhoff and Kane 1993, Soskice 1994) is augmented by the riddle of why German firms pay for continuous training.

A step towards solving these questions lies in determining how "far" from the training firm separating trainees wander, given the wages they obtain. The model outlined in Section 2 provides a way to formalize this. In this paper, I define mobility along sectoral lines. Given the institutional structure of German industrial relations, if mobility is largely restricted to the training firm's industry, then an implicit coordination[19] may justify continuous training of workers paid for by firms.

4.4 Incidence of continuous training

As Table 2 on page 25 showed, more than a fifth of all workers in our sample have experienced at least a day of training in Period 1. What determines the incidence of training? Results of logit analyses are reported in Table 9 on page 31.

For the full sample, the table shows that the probability of receiving on-the-job training increases in net income, decreases with initial (potential) experience, and increases in tenure with the present firm. Workers with more weekly hours are more likely to receive training, even after controlling for part-time. Workers without any further educational achievements are less likely to receive training, but receipt is otherwise unrelated to education, once blue-collar status has been controlled for.

Most of these measures, with the exception of labor-market experience, may be interpreted as indicators for the unobserved ability of the

[19] Soskice (1994) calls it the high skill-high education equilibrium.

worker. Thus, Table 9 would indicate that more able workers receive more training.

The family background variables reported in Rows 9 through 12 are never individually significant, but for the full sample as well as for 1989, these variables are jointly significant, and generally have a positive signs. Presence of a partner and of children in school age increase the likelihood of receiving training, both variables being related to decreased family mobility.

None of the variables describing the training requirements on the job and past occupational mobility, are significant, neither individually nor jointly. In particular, workers in jobs which usually require an apprenticeship are not significantly more likely to receive training than others, even if these same workers already have an apprenticeship (the interaction term in Row 16).

Finally, the major distinction as to the incidence of training is blue-collar status. White-collar workers tend to train more frequently, a point already apparent in Table 2

Can these results be taken as evidence that sorting or selection, apart from occupational sorting, plays no role in the incidence of continuous training? To the extent that a higher salary proxies for higher ability, sorting by ability would seem to play a role. But the sorting criterion of interest in the case of training which is not firm-specific is sorting by inherent inter-firm mobility. Even if training were general, employers would be willing to pay for it if either the worker can be subsequently tied to the firm (through higher wages, promotion prospects, or other methods),[20] or the worker is inherently less mobile, giving the firm time to recoup its investmnet. It is far from clear that a high salary need be correlated with an inherently lower mobility. A far better indicator of mobility would seem to be family background variables such as presence of children in school age or presence of partner, as these variables have been shown to negatively affect migration probabilities.[21,22] Here, these variables jointly increase the likelihood of training, lending support (albeit weak support) to the hypothesis that firms select workers based upon a worker's inherent probability of leaving.

A different but nonetheless interesting point in Table 9 is the strong

[20]See f.i. Acemoglu and Pischke (1998), where the firm pays for general training because it enjoys an ex-post informational advantage.

[21]Long (1972), Mincer (1978), Sandell (1977).

[22]Some results reported in the U.S. literature indirectly lend support to the mobility-based selection story. Results reported in Lynch (1992b) indicate that married workers and more experienced workers are significantly more likely to receive training, where both characteristics are habitually correlated with longer tenure. See also Altonji and Spletzer (1991) and Royalty (1996).

relationship between income on the present job and the incidence of training. Remember that a fair number of workers cited financial reasons as an impediment to training. A higher income, if related to higher wealth, would alleviate this constraint, leading to the observed sign. Note that this is true even after controlling for blue-collar status, experience, and tenure, and thus to a certain degree controlling for career advancement. On the other hand, as indicated earlier, most training takes place during working hours, and with the sanction of the employer, thus presumably the worker continues to draw a salary, obliviating the need for any substantial financing on the worker side, but pointing towards companies willingness to incur substantial wage costs in order to provide training.

4.5 Industry mobility

Industry mobility conditional on changing jobs is high, as Table 10 on page 32 reports. More than 54 percent of those changing employers between Periods 1 and 2 also change industry. Relating this to the incidence of training in the first period, a strong pattern appears: Only 47 percent of those having received some training in the first period change industry when changing employers, compared to 57 percent for those without training. Note also that the probability of non-employment is lower for those with training, indicating a higher employment attachment, be it with the training employer or some other employer. Most of the employment effect seems to come from an increase in jobs within the same industry with the old or new employers, rather than through an increase in employment in other industries. The rest of this paper will elaborate on this result in order to control for a variety of other factors which might affect incidence of training and mobility.

5 Mobility of trained workers

Table 10 on page 32 reported frequency counts for the proportion of job separations that are either not employed, employed in the same sector, or employed in a different sector at the end of the second period, by incidence of training. The numbers indicate that workers having received training are less likely to be non-employed, and conditional on being employed, are more likely to be employed in the same sector. The following models will correlate these mobility patterns with a worker's or his job's observable characteristics.

Coefficients for training variables in the multinomial model of sectoral

mobility are reported in Table 11 on page 33, Panel A, and the computed parameter $M_2 = \beta_2 - \beta_1$ is reported in Panel B. Note that as pointed out on page 9, although the coefficients reported in Panel A are used to compute M_{job}, the sign of M_{job} will also depend on the computed probabilities when the coefficients are of opposite sign. This is the case for a number of variables. However, one feature of Panel A is that none of the training variables significantly affect the probability of a job in a different industry vis-a-vis the base case of non-employment. Any action comes from changes in the probability of employment in the same sector.

Thus, a worker who at his last job was employed in an occupation corresponding to his apprenticeship had a higher probability of employment in the same sector with respect to non-employment (Panel A) as well as with respect to employment in a different sector (Panel B). However, given that the coefficients on this variable are of different signs for the two employment destinations, it is not clear that the probability of employment is increased overall.

Columns (a) through (c) explore the sensitivity of the coefficients to the inclusion of industry and occupational controls. The results do not seem to be particularly sensitive to the changes in specification despite the small number of observations.

The strongest effect, as was to be expected, is present for those workers still in the occupation they apprenticed in. Since apprenticed occupations are highly industry-specific, it comes to no surprise that a such a worker is highly likely to stick to his present industry, even though I do not control for time elapsed since his apprenticeship ended. Notice however that the positive employment is only present in his present industry, not for jobs ultimately taken up in different industries, where his employment likelihood is actually reduced, though not significantly so.

For the indicator of continuous training, the effect seems to be smaller. However, as Table 3 on page 26 showed, spells of continuous training are significantly shorter than the usual two to three year long apprenticeship spell. Thus, it may seem at first glance astounding that the effect is on the same order of magnitude as that for the apprenticeship indicator.

Turning to Panel B, the industry specificity of apprenticeship is outlined by the a fact that the likelihood of industry mobility is significantly reduced. Continuous training reduces the likelihood of a sectoral move as well, though this parameter is never significant.

The interaction term captures any supplementary effect for those workers still in their apprenticed professions who receive further training. The sum of the coefficients on the interaction and on continuous training summarizes the *additional* effect of continuous training for these workers. Throughout, this sum is never significantly different from zero, even

though the parameter itself is positive and significant.

Table 11 thus seems to indicate that if any mobility-reducing effects of continuous training are present, they are too small to be of statistical significance. However, it turns out that the likelihood of non-employment differs across time. Table 12 on page 34 reports coefficients from a logit model of employment conditional on separation, where the two employment destinations are grouped into one. As the first column reports, being an apprentice does not significantly increase the overall probability of employment when not distinguishing sectors, whereas continuous training increases overall employment probabilities significantly except for apprentices. However, as the dummy variable for 1994 indicates, employment probabilities conditional on separation are significantly lower in 1994. The next two columns apply the same model on each year separately, and as the selected other coefficients show, the structure of re-employment is changed only with respect to the training variables, not with respect to personal characteristics like labor market experience or marital status. To explore whether the two periods show different patterns as to the mobility effects of training, I ran separate regressions for the 1989-1990 and 1993-1994 periods, results for which are reported in Tables 13 on page 35 and 14 on page 36.

In 1990, both training variables increase employment probabilies in both destinations, significantly so for employment in the same industry by apprentices and by trainees if industry and occupational controls are included (Column (c)). In particular, the point estimates are large in both sectors for continuous training. This is reflected in Panel B, where the probability of a sectoral move is not significanlty affected by continuous training. As before, there is no supplementary effect of training for apprentices.

This story changes in 1994. Then, employment probabilities in a different sector are *reduced* by training, though none of the coefficients are significantly different from zero. In Panel B, apprentices are as before less likely to leave their sector, but this is now also true for trainees, significantly in Column (a) and with marginal p-values in other specifications. The interaction term is significant, suggesting again that apprentices receiving supplementary training are no less mobile than apprentices without further training.

A glance at business cycle indicators (see Figure 1 on page 38 in Appendix) shows that the two periods under consideration here were at opposite ends of a business cycle. 1990 was the year of the unification boom. Unemployment was declining, and manufacturing booming. In 1994, recession was well under way, unemployment increasing (only to decrease again in 1998), and production declining dramatically. This

may explain why re-employment probabilities are so much lower in 1994.

The model presented in Section 2 can be extended to account for business cycle shocks Define an asymmetric shock to one industry as a shock to q, the proportion of job offers coming from industry 2. Redefine r such that $r = r_{12} = r_3$, and define a symmetric shock as a shock to r_{12}, the job offer arrival rate. The "offer arrival rate" from the household sector 3 is assumed unaffected by business cycles. Then it can be shown that $\partial^2 M_2(k)/\partial k \partial q$ is zero if training is completely general, and indeterminate otherwise, depending on the relative magnitudes of M_2, λ, and $F_1(k)$. M_2 is never affected by a shock which reduces the overall job offer rate, because it is measured conditional on having left the firm and having found an (acceptable) job. Furthermore, $\partial^2 M_{job}/\partial k \partial r_{12}$ is zero if training is firm-specific, and again indeterminate otherwise, depending on the relative magnitudes of r_{12} and M_{job}. The sign of $\partial^2 M_{job}/\partial k \partial q$ is highly indeterminate in all cases.

This extension of the model gives few theoretical predictions towards an understanding of the observed changes in the parameters of interest, since it requires an understanding of the nature of the shock. If it is assumed that the shock is indeed asymmetric, then the reductions in both $\partial M_{job}/\partial k$ (Table 12 on page 34) and $\partial M_2/\partial k$ (Table 11 on page 33) would be in inconsistent with completely general capital. However, since the true nature of the shock is unknown, this would be highly speculative.

Up until this point, the length of training has not been used in the present analysis. Given the categorical character of this variable and the width of some of the intervals (see Table 3 on page 26), using the mean of the interval would necessitate correction for substantial measurement error. Here, I split the indicator variable into two separate categories, indicating short training spells if duration was less than one month, and long training spells if duration was longer than one month. Figure 2 on page 39 shows the distribution by destination. It is obvious that those workers who obtain a job in a different industry are those with *longer* spells.

The result from Figure 2 is confirmed to a certain degree by the regression results in Table 15 on page 37. For both periods together, long spells increase sectoral mobility. However, this coefficient is neither significant nor stable across time. The pattern found in the previous tables is replicated by the indicator for short training spells, which now is significant for 1994 as well as for the full sample.

At a first glance, this would seem contrary to a human capital model, since the amount of acquired human capital is usually assumed to increase with the time spent on training. One explanation may lie in the worker's motivation for training. If training is undertaken to improve

job opportunities, then these job opportunities may occur outside of the present firm. One way to take this into consideration would be to look at the reason the worker stated for the job separation.[23] Unfortunately, the responses to these questions are missing for about half our sample, and concentrated among those non-employed in Period 2. Sample sizes drop dramatically, and inference is not feasible.

[23] Questions GP24 and KP23.

6 Conclusion

This paper has proposed a model to test for the sector-specificity of continuous training. Applying this model to West German data from 1989-90 and 1993-94, the ability of the data to distinguish between competing assumptions of specificity is at most tepid. When an apprenticeship in the last held occupation is controlled for, continuous training seems to weakly increase employment in both sectors, and decreases sectoral mobility, but only for short training spells. When separating the sample into two subperiods, the effect of continuous training on sectoral mobility is present only in the recession year 1994, but not in 1990. The increase in employment, sign of both sector-specific and general human capital, is only present in 1990. Furthermore, continuous training has no effect on the sectoral mobility for workers who still work in the occupation they apprenticed in, more than half the present sample.

Note that firm-specific continuous training would complement the Soskice (1994) model of apprenticeship training as non-firm specific human capital. In the present analysis, workers in their apprenticed occupation are less mobile across sectors than other workers, but are as affected in their re-employment probabilities by a recessionary period.

It is not clear whether the absence of strong results is an artefact of the small sample sizes or constitutes a negation of the sector-specifity, or even the generality of continuous training in Germany. In related analysis using American data, I constructed complete job histories for young workers and showed that on-the-job training (which includes American apprenticeships) is sector-specific (Vilhuber 1997). Employment attachment increases with the quantity of training, whether or not acquired in the immediately preceding sector, and sectoral mobility is reduced by the quantity of training (total hours) acquired with the present employer or other employers. This is also true for the subset of workers who had been selected by previous employers to receive training, and who have to a certain degree revealed their type, if such selection mechanisms are at work. That type of analysis is not feasible here except to the degree that apprenticed workers are such a subset.

The temporal instability of the coefficient here may be related to the business cycle, though such inference from only two points in time would be premature. It would however extend Becker's (1964,1993) insight that "training may be useful [...] in a set of firms defined by product, type of work, or geographical location"(Becker 1964,1993, pg. 49) to the case where the state of the economy defines the number of firms as "buyers" of a worker's human capital. Though not feasible with the present dataset, it remains an avenue to be pursued further.

Thus, weak evidence presented here for Germany suggests that training as dispensed or sanctioned by firms, because occuring concurrently with employment and possibly during working hours, is correlated with mobility patterns consistent to some degree with the presence of sector-specific or general human capital. Training would appear to confer industry-specific human capital, of use not to all firms in the economy, but at least to a larger number of firms producing similar outputs as the training firm. This result obviously does not directly answer the question why firms would finance training which could be of use to other firms ("general" human capital). And it does not preclude the simultaneous presence of firm specific capital. If trained employees stay long enough with the training firm, the return on investment for the firm may be positive. Results in Vilhuber (1997) suggest that this effect may be minor for U.S. workers, and results not reported here for the GSOEP suggest that the probability of leaving the training employer by the time of the Period 2 interview is not significantly affected by the presence of training.

One explanation for Germany may lie in the high degree of unionization and the subsequent homogeneity of wage scales within an industry. If reasons of separation are not related to training itself, then firms may gain trained employees in the same measure as they lose them, and benefit from a high industry-wide incidence of training. To be feasible, firms must perceive it in their own interest not to shirk, and this is tricky, but the mechanism may be the same that allows for such widespread apprenticeship training.[24] This explanation would seem not to work in the United States, but different equilibria with different degrees of training incidence may well exist.

[24] See Soskice (1994) for more details in the case of apprenticeships.

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Table 1: Cross-sectional incidence

	GSOEP		NLSY	
	Full	Young	Train	OJT
all	2.05	3.04	2.19	1.08
1984	2.45	3.10	2.25	1.07
1985	2.47	3.65	1.84	0.78
1986	2.10	3.39	2.25	1.12
1987	2.56	4.12	.	.
1988	1.74	3.99	2.34	1.22
1989	1.57	2.70	2.15	1.19
1990	1.68	2.83	1.65	0.97
1991	1.73	3.11	1.57	1.03
1992	2.30	3.69	1.71	1.07
1993	1.70	2.35	2.22	1.32
1994	2.23	2.83	.	.
1995	2.09	1.62	.	.

GSOEP: Percentage of full-time workers in on-the-job training (excl. apprenticeships) at time of interview. The definition of on-the-job training only includes "career re-training" and "vocational advanced training". See Questions FP09 and JP14. Young sample is between 19 and 27 in 1984.
NLSY: Overall average is for 1979-1993, all workers with a job, possibly not at work, and currently in an unfinished (OJT: on-the-job) training spell. NLSY respondents are between 19 and 27 in 1984.

Table 2: Sample means

	All	Moved	Trained
Proportion 1993	0.456	0.364	0.495
Incidence of training within last year	0.237	0.210	1
Left Period 1 employer	0.177	1	0.157
Job:			
Net income (DM 1993)	2713.373	2331.132	3228.242
Contractual hours	39.521	39.268	39.428
Actual hours	42.946	42.698	44.225
Part-time job	0.012	0.043	0.010
Potential experience at start of Period 1	21.928	18.669	19.265
Tenure (years)	10.870	8.400	10.042
Blue-collar	0.523	0.586	0.261
Family:			
Partner present	0.761	0.629	0.793
Married	0.692	0.539	0.711
Partner works	0.375	0.314	0.385
Kids < 16 yrs old	0.403	0.319	0.486
Age	39.358	36.049	37.577
Education:			
Years of education	11.430	11.379	12.312
No professional degree	0.119	0.167	0.050
Necessary training:			
Some	0.289	0.279	0.171
Apprenticeship	0.563	0.564	0.597
Currently in apprenticed prof	0.569	0.568	0.642
Number of obs:	2755	508	654

For sample selection criteria, see text.

Table 3: Sample means of training variables

	All		Moved	
Certificate received	646	0.664	106	0.641
Hours per week	641	21.57	104	19.86
(min/max)		1/90		2/80
Number of courses:				
in last 3 yrs	641	3.84	106	3.89
(min/max)		1/36		1/20
in Period 1:				
1	320	48.93	53	49.53
2	178	27.22	34	31.78
3	156	23.85	20	18.69
Respondents with more than three spells in last three years		*0.376*		*0.387*
of which: exactly three in past year		*0.054*		*0.045*
Reason for training:				
on-the-job training	651	0.070	106	0.084
promotion qualification	651	0.351	106	0.386
new demands	651	0.683	106	0.594
other	651	0.107	106	0.169
On whose initiative:				
own initiative	523	0.399	80	0.462
company. initiative	523	0.321	80	0.300
both	523	0.279	80	0.237
Occured during working hours:				
Entirely	653	0.739	106	0.660
Partially	653	0.076	106	0.066
Not at all	653	0.180	106	0.254
Length of training:				
only one day	654	0.151	107	0.177
up to one week	654	0.584	107	0.542
up to one month	654	0.107	107	0.056
up to 3 months	654	0.100	107	0.130
up to one year	654	0.025	107	0.056
up to two years	654	0.016	107	0.009
more than 2 yrs	654	0.013	107	0.028

Sample of trained persons only. Sample selection criteria are described in the text. Note that number of observations are not constant due to missing data on some training spells.

Table 4: Opinions on training

A. *Further training can be done for different reasons. Which of the following reasons is applicable in your case? (More than one choice is possible.)*

1. complete the final examinations for your degree	5.0%
2. retrain for a different job	10.3%
3. update and review your job knowledge	31.5%
4. keep up-to-date with the latest developments	42.2%
5. become qualified for a better job	34.6%
6. expand field of knowledge for greater range of job opportunities	26.8%
7. none of these, no intention to obtain further training	37.6%
Update knowledge (3 and/or 4)	49.2%
Better qualifications for job opportunities (5 and/or 6)	44.9%

B. *You may also have specific reason not to undertake further training. Which of the following reasons is applicable in your case?*

1. Further training will not improve my job prospects	40.3 %
2. No time for further training	39.8 %
3. Cannot afford to give up my income or pay for further training	47.9 %

C. *How well could you use this training in case you changed jobs?*

1. Not at all	9.6%
2. In a limited way, only a small part	22.7%
3. To a large extent	34.5%
4. Completely	33.3%

Frequency of respondents giving a positive answer to the question. Question C. was only asked in 1993 and refers to the most important training of the respondent.

Table 5: Financial assistance

68. *Do you get financial assistance or continued payment of wages from your employer, employment office, or from somewhere else during your further training?*

No	33.6%
Yes	66.4%
Of those receiving assistance:	
from the employer	88.5%
from the employment office	11.4%
from somewhere else	1.6%

Note: Question refers to the respondent's most important training.

Table 6: Financing and transferability

Usefulness of training on other job	*Financial support*			
	Employer	Other	None	Total
none	9.51	2.78	11.29	9.67
small	22.33	8.33	26.34	22.76
large extent	34.29	40.28	33.60	34.45
completely	33.86	48.61	28.76	33.13
Observations	694	72	372	1138

Note: Questions refers to the respondent's most important training. The questions were asked in 1993 only.

Table 7: Financial support and organizing entity

	Financial support from:			
Organizer	Employer	Other	None	Obs
1. Employer	69.81	0.00	30.19	212
2. Company institute	77.78	1.39	20.83	72
Directly employer-related (1+2)	*71.83*	*0.35*	*27.82*	*284*
3. Employer of prof. association	66.29	10.11	23.60	89
4. Manufacturer	77.78	0.00	22.22	18
Employer-related (1+2+3+4)	*70.84*	*2.56*	*26.60*	*391*
5. Adult education center (VHS)	20.83	0.00	79.17	24
6. Trade union, university, church	100.00	0.00	0.00	8
7. Private school or institute	68.82	5.38	25.81	93
8. Other	57.14	0.00	42.86	7
Total	*68.45*	*2.87*	*28.68*	*523*

Note: Question on financing refers to most important training spell only. For comparability with Table 6, only 1993 data reported.

Table 8: Timing and organizing entity

Organizer	*Training occurs partially or fully during working hours*	
	No	Yes
1. Employer	10.57	89.43
2. Company institute	14.62	85.38
Directly employer-related (1+2)	*11.51*	*88.49*
3. Employer or prof. association	41.57	58.43
4. Manufacturer	13.89	86.11
Employer-related (1+2+3+4)	*19.58*	*80.42*
5. Adult education center (VHS)	87.61	12.39
6. Trade union, university, church	38.61	61.39
7. Private school or institute	42.51	57.49
8. Other	48.24	51.76
Non-employer-related (5-8)	*50.07*	*49.93*
Total	*70.59*	*29.41*

Note: Percentages of training spells reported. Respondents could report up to three training spells.

Table 9: Incidence of training

		All	1989	1993
1	1993 dummy	-0.594 (*-1.64*)		
2	Net income *(in 1000 DM)*	0.244** (*4.78*)	0.131 (*1.565*)	0.312** (*4.553*)
3	Weekly hours	0.015* (*2.25*)	0.015 (*1.555*)	0.015 (*1.545*)
4	Part-time	0.166 (*0.35*)	-1.128 (*-1.022*)	0.756 (*1.318*)
5	Initial experience	-0.055** (*-7.24*)	-0.057** (*-5.280*)	-0.057** (*-5.228*)
6	Tenure	0.015* (*1.99*)	0.008 (*0.769*)	0.025* (*2.423*)
7	Absence of degree	-0.546** (*-2.58*)	-0.725* (*-2.225*)	-0.429 (*-1.476*)
8	Education (in years)	-0.009 (*-0.31*)	-0.016 (*-0.362*)	-0.010 (*-0.228*)
9	Married	-0.089 (*-0.49*)	0.240 (*0.858*)	-0.353 (*-1.372*)
10	Presence of kids < 16 yrs	0.158 (*1.31*)	0.022 (*0.125*)	0.267 (*1.544*)
11	Partner works	0.097 (*0.82*)	-0.067 (*-0.388*)	0.263 (*1.560*)
12	Partner present	0.327 (*1.63*)	0.471 (*1.505*)	0.164 (*0.607*)
13	Some training necessary	-0.060 (*-0.28*)	-0.206 (*-0.677*)	0.055 (*0.168*)
14	Apprenticeship necessary	0.323 (*1.36*)	0.403 (*1.241*)	0.183 (*0.496*)
15	Currently in appr. profession	0.101 (*0.50*)	0.063 (*0.219*)	0.159 (*0.533*)
16	Interaction term	-0.228 (*-0.91*)	-0.377 (*-1.066*)	-0.084 (*-0.224*)
17	Blue Collar	-1.134** (*-8.99*)	-1.214** (*-6.732*)	-1.006** (*-5.533*)
	Observations	2831	1496	1335

Logit of incidence of training in Period 1 based on characteristics at start of Period 1. All regressions also include a constant, 12 industry controls, 8 regional controls, and controls for length of Periods 1 and 2. z-statistics in parentheses. ** denotes significance at 1 percent level, * at 5 percent level, + at 10 percent level.

Table 10: Sectoral mobility and training

			Destination	
	Same Employer	Not Employed	Different Employer, *Switched industry*	
			No	*Yes*
No training	75.52	16.51	3.44	4.53
			43.21	*56.79*
Received training	78.16	12.09	5.14	4.60
			52.78	*47.22*
Total	**76.09**	**15.56**	**3.81**	**4.54**
			45.60	*54.40*

Rows sum to 100 percent.

Table 11: Mobility conditional on separation

	(a)		(b)		(c)	
Industry employed:	same	other	same	other	same	other
A: Employment effects						
In appr. prof.	1.104** (*2.716*)	-0.284 (*-0.779*)	1.143** (*2.729*)	-0.231 (*-0.*621)	1.165** (*2.*718)	-0.281 (*-0.*731)
Continuous training	0.763 (*1.491*)	0.157 (*0.320*)	0.947+ (*1.772*)	0.219 (*0.*435)	0.943+ (*1.*744)	0.286 (*0.*554)
Interaction	-0.715 (*-1.156*)	0.396 (*0.645*)	-0.964 (*-1.491*)	0.272 (*0.*436)	-0.932 (*-1.*652)	0.211 (*0.*334)
Year dummy	-0.033 (*-0.115*)	0.158 (*0.568*)	-0.099 (*-0.330*)	0.160 (*0.*556)	-0.133 (*-0.*440)	0.173 (*0.*592)
Blue Collar	-0.434 (*-1.454*)	-0.106 (*-0.345*)	-0.545+ (*-1.638*)	-0.014 (*-0.*042)	-0.709+ (*-1.*652)	-0.495 (*-1.*147)
B: Effect on sectoral mobility conditional on employment						
In appr. prof.	-1.388**		-1.374**		-1.446**	
Continuous training	-0.606		-0.728		-0.657	
Interaction	1.111+		1.236+		1.143+	
Year dummy	0.191		0.259		0.306	
Blue Collar	0.328		0.531		0.214	
Industry controls	*No*		*Yes*		*Yes*	
Occupation controls	*No*		*No*		*Yes*	
Observations	508		508		508	
Log-Likelihood	-432.05		-413.22		-409.15	

z-statistics in parentheses. Multinomial logit of sectoral mobility. Base category is non-employment. All regressions include net monthly income, hours worked, an indicator for part-time status, and tenure on the last job worked, experience and its square, years of education, an indicator for the absence of a degree, and marital status at the end of Period 1, and controls for length of Periods 1 and 2.
** denotes significance at 1 percent level, * at 5 percent level, + at 10 percent level.

Table 12: Employment attachment

	All	1990	1994
Employment effects			
In appr. prof.	0.418 (*1.395*)	0.985* (*2.268*)	-0.276 (*-0.577*)
Continuous training	0.914* (*2.075*)	1.220* (*2.056*)	-0.058 (*-0.075*)
Interaction	-0.807 (*-1.555*)	-1.539* (*-2.194*)	0.337 (*0.375*)
Year dummy	-1.747* (*-2.373*)		
Pot. Experience	0.111* (*2.497*)	0.115* (*1.978*)	0.113 (*1.465*)
Experience squared	-0.003**(*-3.559*)	-0.004**(*-2.854*)	-0.004* (*-2.151*)
Married	0.563* (*2.296*)	0.450 (*1.332*)	0.607 (*1.535*)
Observations	508	323	185
Log-Likelihood	-317.59	-176.51	-129.08

z-statistics in parentheses. Logit of employment attachment. All regressions include net monthly income, hours worked, an indicator for part-time status, 10 industry controls, control for blue-collar status, and tenure on the last job worked, experience and its square, years of education, an indicator for the absence of a degree, and marital status at the end of Period 1, and controls for length of Periods 1 and 2. ** denotes significance at 1 percent level, * at 5 percent level, + at 10 percent level.

Table 13: Mobility conditional on separation: 1990

	(a)		(b)		(c)	
Industry employed:	same	other	same	other	same	other
A: Employment effects						
In appr. prof.	1.331** (*2.564*)	0.116 (*0.234*)	1.563** (*2.858*)	0.278 (*0.528*)	1.570** (*2.787*)	0.261 (*0.479*)
Continuous training	0.950 (*1.505*)	0.701 (*1.161*)	1.070 (*1.600*)	0.671 (*1.060*)	1.162+ (*1.685*)	0.770 (*1.172*)
Interaction	-1.202 (*-1.574*)	-0.625 (*-0.818*)	-1.614* (*-1.992*)	-0.661 (*-0.837*)	-1.690* (*-2.036*)	-0.796 (*-0.981*)
Blue Collar	-0.568 (*-1.542*)	-0.152 (*-0.373*)	-0.655 (*-1.594*)	-0.093 (*-0.204*)	-0.618 (*-1.184*)	-0.645 (*-1.081*)
B: Effect on sectoral mobility conditional on employment						
In appr. prof.	-1.215+		-1.285+		-1.309+	
Continuous training	-0.249		-0.399		-0.392	
Interaction	0.577		0.953		0.894	
Blue Collar	0.416		0.562		-0.027	
Industry controls	*No*		*Yes*		*Yes*	
Occupation controls	*No*		*No*		*Yes*	
Observations	323		323		323	
Log-Likelihood	-274.44		-258.37		-254.72	

For details, see Table 11 .

Table 14: Mobility conditional on separation: 1994

	(a)		(b)		(c)	
Industry employed:	same	other	same	other	same	other
A: Employment effects						
In appr. prof.	0.639 (*0.878*)	-0.654 (*-1.093*)	0.347 (*0.447*)	-0.703 (*-1.128*)	0.474 (*0.580*)	-0.797 (*-1.236*)
Continuous training	0.823 (*0.823*)	-1.049 (*-1.010*)	0.658 (*0.607*)	-0.860 (*-0.793*)	0.645 (*0.575*)	-0.850 (*-0.755*)
Interaction	-0.519 (*-0.437*)	2.145 (*1.781*)	-0.672 (*-0.496*)	1.619 (*1.287*)	-0.798 (*-0.552*)	1.732 (*1.319*)
Blue Collar	-0.254 (*-0.440*)	-0.196 (*-0.379*)	-0.646 (*-0.963*)	-0.168 (*-0.284*)	-0.985 (*-1.161*)	-0.432 (*-0.569*)
B: Effect on sectoral mobility conditional on employment						
In appr. prof.	-1.293*		-1.050		-1.271+	
Continuous training	-1.872+		-1.518		-1.495	
Interaction	2.664*		2.291+		1.733+	
Blue Collar	0.058		0.478		0.553	
Industry controls	*No*		*Yes*		*Yes*	
Occupation controls	*No*		*No*		*Yes*	
Observations	187		187		187	
Log-Likelihood	-147.47		-135.59		-133.92	

For details, see Table 11.

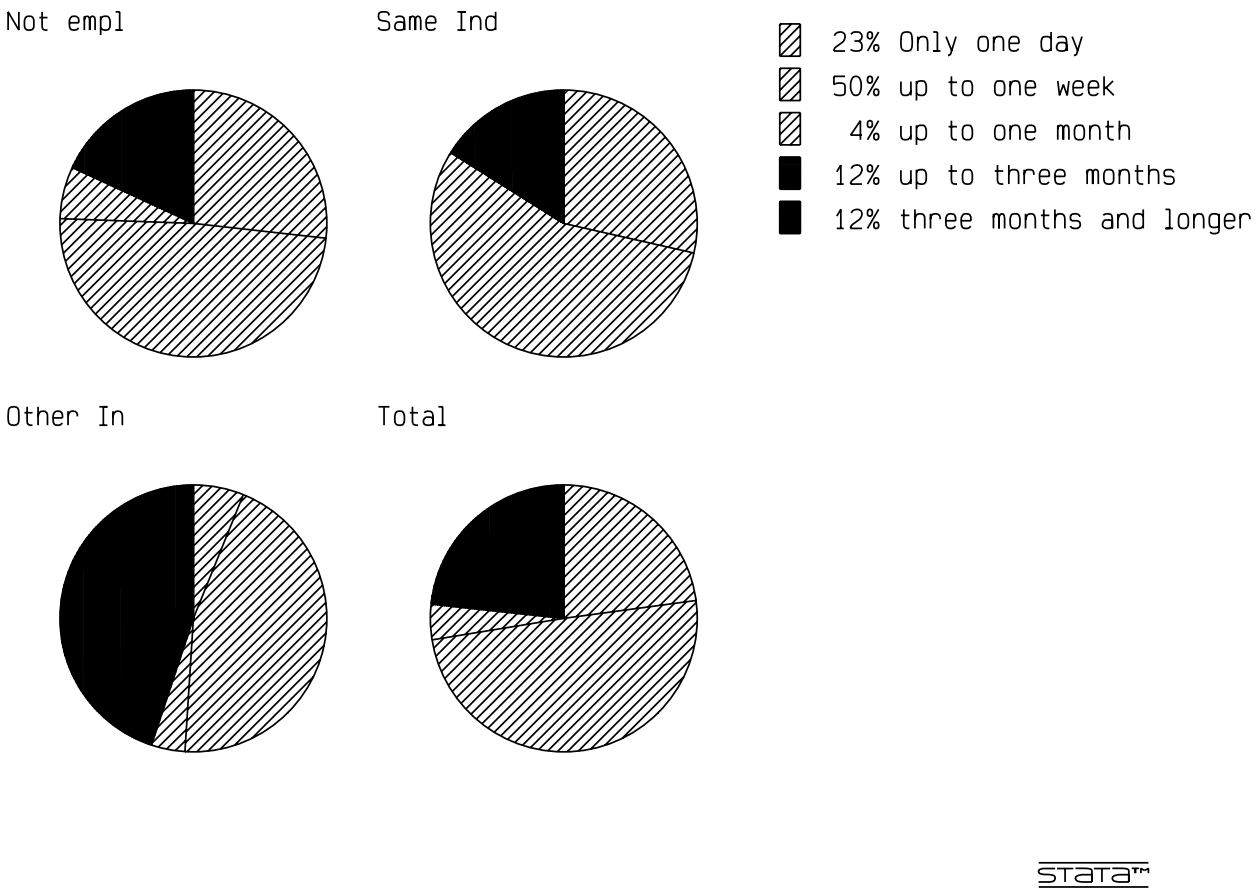
Table 15: Mobility conditional on separation, (cont)

A: Employment effects						
	All		**1990**		**1994**	
Industry employed:	same	other	same	other	same	other
In appr. prof.	1.011** (*2.656*)	-0.236 (*-0.647*)	1.543** (*2.829*)	0.273 (*0.519*)	0.320* (*0.408*)	-0.711 (*-1.131*)
Continuous training:						
Short duration	0.998+ (*1.835*)	-0.061 (*-0.114*)	1.113 (*1.637*)	0.457 (*0.493*)	0.895 (*0.796*)	-1.267 (*-1.115*)
Long duration	0.331 (*0.370*)	1.029 (*1.462*)	0.199 (*0.879*)	1.258 (*1.418*)	0.007 (*0.002*)	0.034 (*0.024*)
Interaction	-0.895 (*-1.371*)	0.152 (*0.236*)	-1.153+ (*-1.880*)	-0.721 (*-0.898*)	-0.402 (*-0.289*)	1.146 (*1.115*)
Year dummy	-0.062 (*-0.206*)	0.133 (*0.644*)				
Blue Collar	-0.551+ (*-1.650*)	-0.037 (*-0.111*)	-0.641 (*-1.554*)	-0.109 (*-0.240*)	-0.719 (*-1.041*)	-0.268 (*-0.435*)
B: Effect on sectoral mobility conditional on employment						
In appr. prof.	-1.247**		-1.270*		-1.031	
Continuous training:						
Short duration	-1.059+		-0.656		-2.162+	
Long duration	0.698		1.059		0.027	
Interaction	1.047		0.432		1.548	
Year dummy	0.195					
Blue Collar	0.514		0.532		0.451	
Observations	508		323		185	
Log-Likelihood	-410.00		-256.98		-143.04	

All regressions include 10 industry controls. Short training spells are shorter than 1 month. For further details, see Table 11.

Figure 1: German unemployment and manufacturing index
Data source: BLS.

Figure 2: Length of training by destination



A GSOEP questionnaires

A.1 Current training in GSOEP and NLSY

A.1.1 GSOEP (1993)

13. [JP13] Are you receiving education at the moment? In other words are you in school, career training, or are you attending a further education course?

yes _____
no (proceed to question 15) _____

14. What sort of education or training is this?

[JP1401] GENERAL SCHOOLING
short-course secondary school _____
intermediate type of secondary school _____
academically-oriented secondary school _____
comprehensive secondary school _____
night school-secondary _____
technical high school _____

[JP1402] HIGHER EDUCATION
technical college _____
university/college _____

ADVANCED TRAINING COURSES

[JP1403] vocational retraining _____
[JP1404] advanced vocational training _____
[JP1405] vocational rehabilitation _____
[JP1406] general or political training _____
[JP1407] other _____
fill in here _____

BASIC VOCATIONAL TRAINING

[JP1408] basic vocational training year, vocational preparation year _____
[JP1409] vocational school (not including apprenticeship) _____
[JP1410] apprenticeship _____
[JP1411] specialized vocational school, business school _____
[JP1412] public health school _____
[JP1413] specialized schools such as master-schools or technicians' schools _____
[JP1414] training for the civil service _____
[JP1415] other _____
fill in here _____

A.1.2 NLSY (1989)

The NLSY questions on training are all retrospective for the time period between interviews. To obtain a cross-sectional estimate of training incidence, it is necessary to combine information on all possible training spells with the information on the end date of the training spell. The latter is coded as a zero if training is ongoing at the time of the interview.

```
(R29391.  )   ANY OTHER VOCATIONAL/TECHNICAL TRAINING BEGAN SINCE LAST
               INT?

Record type: TRAINING     Question number: Q1439              Survey year: 89
Variable name: TRN0825

(BESIDES THE TRAINING PROGRAMS WE'VE ALREADY TALKED ABOUT), SINCE
(DATE OF LAST INTERVIEW), DID YOU ATTEND ANY (OTHER) TRAINING PROGRAM
OR ANY ON-THE-JOB TRAINING DESIGNED TO HELP PEOPLE FIND A JOB, IMPROVE
JOB SKILLS, OR LEARN A NEW JOB?

         1551     1 YES
         9054     0 NO


   (...)

(R29405.  )   YEAR COMPLETED/LEFT 1ST VOCATIONAL/TECHNICAL PGM ENROLLED
               IN SINCE LAST INT

Record type: TRAINING     Question number: Q1466              Survey year: 89
Variable name: TRN0839

0  STILL ENROLLED
```

A.2 Training questions in GSOEP

62. (JP62) *In the last three years how many courses or classes for occupational advancement did you take? Please include courses that began earlier if they ended sometime within the last three years.*

Number of courses or classes _____

63. *We would like some additional information about the three most recent courses or classes.*

	Most recent or current course	1	2	3
a)	*In what year and month did this course/class begin?*			
	year	**(JP6301)**	**(JP6313)**	**(JP6325)**
	month	**(JP6302)**	**(JP6314)**	**(JP6326)**
b)	*What was/is the length of this course or class?*	**(JP6303)**	**(JP6315)**	**(JP6327)**
	just one day	_____	_____	_____
	up to one week	_____	_____	_____
	up to one month	_____	_____	_____
	up to three months	_____	_____	_____
	up to one year	_____	_____	_____
	up to two years	_____	_____	_____
	more than two years	_____	_____	_____
c)	*How many hours of class time per week were there?*			
	number of hours	**(JP6304)**	**(JP6316)**	**(JP6328)**
	correspondence course	**(JP6305)**	**(JP6317)**	**(JP6329)**
d)	*What was your reason for taking these courses or classes? (More than one reason possible.)*			
	retraining for another job	**(JP6306)**	**(JP6318)**	**(JP6330)**
	on-the-job training at a new place of work	**(JP6307)**	**(JP6319)**	**(JP6331)**
	become qualified for advancement	**(JP6308)**	**(JP6320)**	**(JP6332)**
	keep up-to-date with new developments in your field	**(JP6309)**	**(JP6321)**	**(JP6333)**
	other	**(JP6310)**	**(JP6322)**	**(JP6334)**
e)	*Was the course/class given during working hours?*	**(JP6311)**	**(JP6323)**	**(JP6335)**
	yes	_____	_____	_____
	partially	_____	_____	_____
	no	_____	_____	_____
	does not apply, was not employed at that time	_____	_____	_____
f)	*Did you receive a certificate when you completed your course/class and you can later use when job hunting.*	**(JP6312)**	**(JP6324)**	**(JP6336)**
	yes	_____	_____	_____
	no			

64. *If in the previous question you answered that you took more than one course or class, which one was most important to your career?*

		Freq.	Value
(JP6401) course number	_____	413	1
		222	2
		101	3

		Freq.	Value
(JP6402) took only one course	_____	793	1
(JP6402) all of equal importance	_____	761	2

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