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CONTINUOUS TRAINING IN GERMANY

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ABSTRACT

Using data from the German Socio Economic Panel, I describe the incidence, attributes, and outcomes of continuous training received by workers in Germany between 1986 and 1989. Further training is primarily a white collar phenomenon and is concentrated among the more highly educated, and in the service sector and in public administration. Much of this training seems to be general and provided to workers by their employers at no direct cost. On the other hand, the training also does not seem to result in large short-run wage gains, especially for men. These results are somewhat at odds with the conventional models about the financing of human capital formation.

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1. Introduction

Many authors see Germany as a model case of an economy where high skilled workers produce high quality products, a combination that seems to be able to insulate German workers from adverse shocks to some extent (see Nickell and Bell 1996). A key ingredient in this stereotypical success story is a set of institutions that promote high levels of training of the German workforce, in particular of those workers which are not college bound. At the core of these institutions is the dual system of apprenticeships and vocational schools. Since any comparable vocational training system is not as well developed or successful in the U.S. and in the U.K., the German apprenticeship system has become the focus of a growing literature studying such training institutions (Soskice 1994, Oulton and Steedman 1994, Harhoff and Kane 1994, Heckman 1993 among others).

But initial vocational qualifications are not enough for workers to remain productive when work environments change quickly or when structural change necessitates switching jobs or occupations. In fact, in a 1979 survey, when German labor force participants were asked where they acquired the skill used most on their job, the two most important avenues of acquiring job skills were formal firm-based continuous training and informal training on-the-job by colleagues or by learning-by-doing. Among workers who completed an apprenticeship, for example, when asked for the single most important place for acquiring job skills only 32 % of respondents named the apprenticeship or vocational school while 58 % point to some form of continuous training or on-the-job learning.[1]

This highlights the importance of post-school continuous training for the acquisition of actually used job skills. This type of training should therefore have an important role in enhancing productivity. As Becker (1965) and Mincer (1974) demonstrate, this productivity enhancement should also be reflected in wages. Despite its potential importance continuous training in Germany has received comparatively less attention than the apprenticeship system. Drawing on a survey of workers with extensive information on continuous training I am trying to fill this gap.[2] My goals in this paper are twofold. First I will give a description of the patterns of such training in Germany. Secondly, I am trying to tell a story

[1]The numbers are my own calculations based on the 1979 survey "Qualification and Career" conducted by the IAB and BIBB.

[2]There is a concurrent paper by Markus Pannenberg (1996), which comes much to the same conclusions.

about the financing of this type of training. Employer involvement in continuous training is large. Much seems to indicate that such training investments are financed by the employers and not the workers. On the other hand, firms also seem to be the primary beneficiaries of the training. Wage gains from training for workers, in particular for men, are modest. Nevertheless, there is some evidence that a large fraction of the training is general rather than firm-specific, so that these finding are at odds with the prototypical Becker-Mincer model.

When I refer to continuous training in this paper, I mean any form of skill enhancement that takes place after a worker has acquired an initial occupational qualification. This is often also referred to as further training or skill improvement training, but I should point out that it could mean the learning of an entirely new occupation or trade. The prevalence of rather informal channels of such training makes it hard to give a good empirical description of continuous training. In this paper, I will focus on the easier task of looking at more formal continuous training, mostly in the form of courses or seminars. This focus is data driven: I use data from the German Socio Economic Panel (GSOEP) which has conducted a special module of questions on continuous training in 1989, six years after it first started interviewing about 5000 households. This allows me to link the training questions to the job histories of individuals.

The rest of this paper is organized as follows. The next section briefly describes the data and discusses a few methodological issues. Section 3 gives some basic facts about continuous training, like the incidence and duration among various groups of workers, as well as characteristics of and self-assessed benefits from the training. The following section analyzes the link between training and subsequent wage growth. Section 5 concludes.

2. The Data

The data used in this paper come from the first six waves of the (West) German Socioeconomic Panel (GSOEP) which has been conducted annually since 1984. It consists of a representative sample of about 4,500 household and includes an oversample of 1,500 foreign household from the five major guestworker nations.[3] The GSOEP is largely patterned after the U.S. Panel Study of Income Dynamics and includes information on demographics and household composition, living

[3]Turkey, Italy, Spain, Greece, and the former Yugoslavia.

quarters, labor market information, income and recipiency of government transfers, time use, and a variety of attitudinal questions. In addition to the core questionnaire, modules of questions on particular topics are conducted each year. In this paper I use the extensive set of questions on continuous training asked in the 1989 interview wave.

The interview sequence, after two questions on attitudes towards continuous training, starts with the following question: "There are various possibilities for work related training. Thinking about the past three years, for your own job related education, have you read books and journals, participated in conferences and congresses, or participated in work related courses?" Respondents who answered that they have taken any courses were asked specific questions about the duration, goals, content, costs, and benefits from the training. It is these types of continuous education courses that I consider in this paper. Since one of my interests in this paper is the degree of employer involvement and financing of training I only consider employed workers.

To ask about the incidence of training poses a basic conceptual problem. Since most continuous training is of short duration it seems insensible to define the incidence of training at a point in time by asking whether workers are currently participating in some training scheme. This would lead to an extreme length bias, oversampling training which extends over a long period to the detriment of shorter training spells. The longer GSOEP time frame of three years will capture more of the programs of shorter duration as well. On the other hand, some of these, if only lasting a day or two, might have been forgotten again by the time the question was asked in the survey, thus reintroducing the same type of bias. For the qualitative results that I report these complications are presumably not too important. As one alternative approach, I selected training spells in progress during 1988 only, the year before the survey. On this subsample I find very similar results to those reported below for the three year window. Concentrating on the full three years allows me to use all the training spells in the dataset, thus enlarging the sample sizes when analyzing specific attributes of the training.

There are 1,418 respondents who reported participation in one or more courses in the survey. In considering specific aspects of the training and because I match the training questions with demographics and employment related information, I typically have samples that are slightly smaller than this. In the tables below, I use all non-missing observations for the specific results I report so that sample sizes, and specific numerical results, differ between tables.

Some details about the training, like starting date, duration, goals, and whether the training took place during work hours or leisure time, are asked for up to three courses. Additional details are available only for the most important course. In order to assess the importance of training I often combine incidence and duration. Duration is asked in two question. The first asks about the total length and allows for answers in seven brackets. The second asks about hours per week spent in training. In order to calculate means and to combine the information on various courses I convert the length of training into a continuous measure by assigning everybody the midpoints of the bracket. This is clearly imperfect but should be reasonably accurate for the bulk of the reported courses which are of relatively short duration (and therefore fall into rather tight brackets). Using my continuous duration measure I can also calculate total hours of training by multiplying weeks of training by hours per week. The distribution of total hours of training is extremely skewed. I therefore often focus on weeks of training neglecting hours per week to lessen the influence of a few long, full–time training spells on least squares type statistics.

Since the dataset is non–representative due to the foreign subsample all results reported here use the cross sectional person weights calculated by the DIW for wave 6 (where the training information comes from). Many of my analyses use variables from various waves so that this is not strictly correct. However, I often combine wave 6 information with job information at the start of the training so that the wave used is individual specific. Since there are no directly appropriate weights available for this type of longitudinal analysis I use the cross sectional weights as an approximation. Similarly, for the panel estimates in section 4 I also use the 1989 cross-sectional weights since the sample is limited to participants in the training survey. Alternative weights yielded very similar results.

3. Basic Facts About Continuous Training

The GSOEP first asks respondents about their attitudes towards training. Table 1 shows that interest in continuous training is large: 66 % of those employed in 1989 indicated some interest in continuous training. Respondents could mention multiple reasons for their interest in training. Among those interested the most important reason is to keep abreast with new developments in the own occupation and to adapt to changes in the way work is done, mentioned by 70 % of the employed respondents. It is interesting how the frequency of this reason differs

between those with various levels of previous skill and working in different job categories: the more skilled the respondent and the more responsible the job, the more likely this reason is mentioned. This may not be surprising since technical and organizational change is faster in more complex positions. So it is actually even surprising that 40 % of those in unskilled blue collar positions see the need for training to adapt to change. In comparison, 62 % of skilled blue-collar workers and 88 % of managers and professionals mentioned this reason. Other important reasons are seen in additional qualifications for promotion, in reviewing vocational knowledge for the current job, and in learning about new areas. Less important reasons are to retrain for a new job or to gain an additional educational qualification. These are mostly named by respondents with little previous qualification.

The optimistic message of widespread interest in continuous training is tempered by the fact that individuals also see important obstacles to obtaining more training. The reasons that would prevent them from participating mentioned by respondents (including those indicating general interest in training) are with relatively equal importance the costs or lost earnings associated with training, time constraints, and the fact that individuals do not see additional training being useful to them on their job. The cost argument is mentioned more often in lower paid education and occupation classes. This is consistent with the most simple human capital model of training where there is both a cost in terms of foregone earnings and a constant flow cost of training. In this case, workers earning a higher wage initially (due to more initial schooling, say) will choose more training. However, this is also consistent with liquidity constraints for financing training investments being more prevalent for lower wage workers. Interestingly, time constraints are mentioned more often by blue collar workers than by managers and professionals. This seems to indicate that the demands of higher level jobs do not necessarily prevent workers from finding the time to participate in continuous training. Public sector workers seem to be most easily able to find the time for training.

3.1. Incidence and Intensity of Training

How do these attitudes compare to the actual incidence of work related continuous training? 27 % of those employed in 1986 report that they participated in at least one course or seminar during the past 3 years. This is a lot lower than the numbers of those indicating interest in training but still substantial. Most of those who did participate in training participated in more than one course (as can be seen

in tables 2 and 5). Only 30 % of those receiving training took only one course. 20 % took two courses and 50 % three or more. Part of this may be due to the fact that those who participate in training more often recall previous courses better. This would create a systematic bias in the responses towards finding training more concentrated on few individuals. The finding that training is rather concentrated is somewhat offset by the fact that courses are shorter for those who participate more often. The average length of the continuous training reported is about ten weeks, although the distribution is quite wide and ranges from one day courses to those lasting two years or more.

The following tables refer to those who are employed in 1986. There is a large variation in who participates in training according to previous education, occupation, industry, and other factors. Table 2 breaks down the training incidence according to position in the occupational hierarchy. 55 % of managers and professionals participated in continuous training but only 17 % of simple white collar workers did. Furthermore, those more likely to participate in training at all are also more likely to participate in more than one course: 64 % of managers and professionals who have participated in some training have taken three or more courses within three years, compared to 33 % of simple white collar workers. White collar workers are more likely to participate in training than blue collar workers. One group that particularly sticks out is public servants. This category includes diverse jobs ranging from mail carrier and railroad workers to high level government bureaucrats, judges, and university professors. Even among those in the lower and middle ranks of the public service (einfacher and mittlerer Dienst) the incidence of training is 49 %, among those in the upper two ranks (höherer and gehobener Dienst) it is above 60 %

Column (5) in the table reports the fraction of those receiving training for whom the training can be linked to their employer. I assume such a link if the training either took place during work hours or the employer is named as the organizer of the training or the employer bore at least some of the monetary cost of the training. More than 80 % of all training of those employed is employer sponsored according to this definition. This indicates substantial employer involvement in continuous training. Those more likely to be trained are also more likely to be trained by their employers.

The next column reports average duration of a course in weeks for those who participated. This refers to the most important course in the assessment of the respondent. There is not as close a link between incidence of training and duration

as there is with the number of courses and employer involvement. In fact, any existing correlation tends to be negative, so that those receiving less training tend to be involved in more extensive training. Taking duration into account means training is actually less concentrated among the more highly educated than looking at incidence alone. Employer sponsored training is even more clearly negatively correlated with duration; but employer involvement is still high even in training that lasts over 3 months.

To assess the overall distribution of training intensity, the last column reports average duration of all reported training taking the mean over everybody including those who did not receive any training. Effectively, this is the product of incidence, the mean number of courses taken (up to a maximum of three), and the average duration per course. This calculation will slightly underestimate the total length of training for those with more courses. The result implies slightly less than four weeks of training per worker but there is still substantial variation left. Most training takes place in the public sector, followed by white collar occupations, blue collar jobs, where the training mostly goes to skilled workers, and finally the self-employed who receive the least training.

Some additional insight is gained by looking at a more detailed occupational breakdown. Table 3 presents a hit list of training incidence in 35 larger two-digit occupations.[4] Computer related occupations lead the list with almost three quarters of all workers attending courses while woodworkers and apparel makers report no training at all. In the upper part of the list are also engineers, technicians and shop floor supervisors; about 50 % of them report participating in training. Among skilled blue collar operatives, the highest incidence in training is among electrical mechanics with about 30 % followed by mechanics (23 %) and tool and die makers (15 %). This seems to indicates that training in manufacturing is not primarily geared towards the skilled workers thus closing the gap between technical personnel and blue collar workers which seems to be the hallmark of high performance work organizations. However, it might be that it is the engineers and supervisors who obtain additional skills through formal courses while passing them on to the blue collar workers through more informal channels. This possibility would not be picked up in the data. Furthermore, the results indicate how highly training is geared towards machinery related jobs among manufacturing operatives.

[4]Standard errors for the occupations listed range from 3 to 10 percentage points so that the exact ranking should be interpreted cautiously.

The breakdown by industry in table 4 confirms the previous results. It should be noted that only incidence and unconditional duration are measured with a reasonable degree of accuracy since some of the industries are small. Training incidence is lower in manufacturing although there is much dispersion within the goods producing sectors. Electrical equipment, the chemical industry and machinery are the training leaders, hardly any training takes place in the textile and wood products industries. The service sector has a much higher average incidence of training but also a good deal of diversity: The government, non-profit organizations, and the educational sector and insurance companies - mostly high skill services - train the most, miscellaneous service industries the least.

Finally, table 5 shows that training among workers in larger establishments and firms is more prevalent (the incidence doubles between the smallest and the largest firms) and more likely to be employer sponsored. There is no systematic relationship between firm size and duration.

Since there is a good deal of correlation among previous training, occupation, industry, and firm size it is useful to learn which of these are driving the results. As it turns out, all the partial correlations hold up even when controlling for other factors, except for the industry effects which become much weaker. This is done in table 6. The first two columns present linear probability models of the total incidence of training and of employer sponsored training on a variety of covariates. The results for both types of training are rather similar: training incidence rises with schooling, with occupational position, white collar or public servant status, as well as with firm size. Moreover, training is concentrated among the younger as can be seen from the coefficient on potential experience (age minus years of schooling minus six). The relationship is close to linear. Women tend to receive less training, even after controlling for education, occupation, industry and part-time status.

The last two columns look at the total number of weeks and the total hours of training. The total number of weeks is constructed from a grouped variable on duration for each of up to three courses.[5] The total number of hours is the sum of the constructed number of weeks multiplied by hours per week for each course. Since those individuals not reporting any participation will have zero weeks or

[5]Rather than constructing a continuous variable from the underlying grouped indicator it might seem more senisble to estimate an ordered probit on the bracketed variable. However, the number of groups is rather large owing to the fact that respondents report up to three courses and the aggregation across courses is not really possible without auxiliary assumptions anyway.

hours these equations are estimated as Tobits. The results are qualitatively similar to the incidence equations. The only main difference emerges for skilled blue collar workers who tend to receive more extensive training as could be seen already in table 2. This is mostly due to the fact that retraining sponsored by the UI office, which is lasts longer than the average training spell, is geared more towards blue collar workers.

If it is true, as these results show, that training is so highly concentrated by observable previous skills the question arises whether, even within observably similar groups, there is much selection into training of those with higher unobserved abilities. In order to asses this, I ran standard wage regressions for those employed in 1986 (i.e. before most of the training reported took place). The regression includes all the regressors in table 6 and a dummy for whether the person participated in training in the following three years. Those who receive training have earnings that are only 0.9 % higher than those without training, with a t-statistic of 0.4, indicating little evidence of selection. The case for selection is slightly stronger for employer sponsored training where the difference is 3.0 % and the t-statistic is 1.5. However, economically this is not a tremendous difference in earnings. Still, this may not mean that there is no selection in who receives training. It could also be that the German system of wage determination does not allow wage differentials not tied to formal qualifications or jobs. Also, given that the average training lasts only ten weeks, an initial difference of 1 to 3 % might easily mask any returns to training.

The basic results so far can be easily summarized. Continuous training is not evenly spread throughout the economy but is rather concentrated among few workers. There are very distinct patterns with more training going to those with a higher previous qualification. Continuous training is more prevalent among white collar and public sector workers rather than blue collar manufacturing workers. Within this latter group much training goes to qualified skilled workers, foremen, and supervisors. Basically no continuous training is received by those with few initial skills. This implies that training is unlikely to be an equalizing force but rather exacerbates preexisting differentials in skills, a finding also reported by Constantine and Neumark (1994) for the U.S.

In general, these patterns look extremely similar to the patterns of work related training found in the U.S. as reported in the January 1983 and 1991 Current Population Surveys (CPS).[6] The incidence of company training is strongly increasing

[6]The results reported here can be found in Bureau of Labor Statistics (1992) and Eck (1993).

in previous education: 23 % of college graduates received formal company training compared to only 5 % of high school dropouts. The occupational distribution in the U.S. is very similar to the findings for Germany with most training going to managers, technicians and protective service occupations. Among blue collar workers the incidence is highest among precision production, craft, and repair workers which are comparable to relatively skilled workers in Germany. Public administration is the industry reporting the most training, followed by finance and insurance, and transportation. The similarity of these patterns seems to reflect something about the nature of job related skills: there are some occupations and industries were continuous learning is more important than in others. Despite their different training institutions and industrial relations systems firms both in the U.S. and in Germany must feel the need to get involved in the training of certain kinds of workers. One major difference should be pointed out, however. The total incidence of formal company training and training in school, the concept most closely corresponding to the GSOEP questions, is much lower in the U.S. (17 % in 1991 compared to 27 % in the GSOEP in the late 1980s). This is the case despite the fact that the CPS question refers to any training received in the current job, not just to the past three years, and average job tenure in the CPS is 8.4 years.[7]

3.2. Training Costs and Reported Outcomes

The next four tables report outcomes of the training. The sample is restricted to those reporting training and employed right before the training began. For those participating in more than one course the outcome measures refer to the course designated the most important by the respondent.[8] Furthermore, unlike in the previous tables, job characteristics refer to the job held at the time when the training started, not necessarily to 1986. The tables break down the training outcomes by job position again. For two of the groups, unskilled and foremen there were to few observations to get reliable estimates so the results are omitted. These groups are represented in the totals reported in the tables, however.

Table 7 reports the goals of the training. These somewhat mirror the reasons why workers might participate in training in table 1. The most important single

[7]The numbers for the incidence of training and average tenure are my own calculations from the January 1991 CPS.

[8]Some of the information reported is only available for this most important course.

reason was to upgrade skills on the current job, named by about two thirds of all respondents. It is more important among white collar and public sector workers than among blue collar workers. Among blue collar workers of equal importance is to receive a qualification for promotion. Initial training on a new job or position is only of some importance among relatively unskilled workers. One interpretation of this is that these positions are typically occupied by workers with few directly usable vocational skills and the few skills necessary are most easily acquired on the particular job. However, it might also just reflect higher turnover (and therefore more new job spells) in these positions. Learning a new occupation is not very important among the employed. This is certainly partly due to the fact that such training often involves a full time commitment and therefore a career interruption.

The last column of the table reports the answers to the question whether course participants received a certificate which they would include in an application for a new job. A positive answer to this question implies not only that the skills received during the training are somewhat general in nature but also that workers perceive the new skills as being important enough to enhance their job prospects or wages at another employer.[9] A large fraction, 62 % of participants, received such a certificate and the incidence does not vary tremendously between job positions. The longer the duration of the training the more likely a certificate is given. But even in 42 % of all courses lasting only one day do trainees receive a written confirmation, and the incidence is only slightly higher if the training took place during the employees' leisure time rather than during work hours. Apparently, employers are providing a good deal of training to their workers that is at least potentially portable.

Table 8 turns to the issue of employer involvement in training. It shows three aspects of employer involvement: whether the training took place during work hours, whether the employer is the direct organizer of the course, and whether the employer took the initiative in selecting the worker for the training. Two thirds of the training reported takes place during work hours and only a quarter during leisure time. Training during leisure time is more important for the blue collar workers and less skilled white collar workers. In slightly more than half the cases is the training directly organized by the employer (or by a supplier).

[9] An alternative explanation would be that these certificates are not important in documenting skills imparted by the training but rather signalling worker characteristics like motivation and initiative. However, if this was important I would have expected to find more significant selection effects into training on the basis of wages.

Employer organization is important for all occupations except the self-employed. In the public sector training is almost exclusively employer organized. This may be a reflection of the large organizations and the inherent economies of scale. In fact there is a clear relationship between firm size and employer organization. For smaller firms (and self-employed) business organizations (including chambers and unions) as well as private providers become a more important source of training facilities. The other category includes universities, adult education centers (Volkshochschulen), and religious organizations.

Despite the large degree of employer involvement, most training is initiated by the workers themselves. Only in a quarter of the cases does the initiative come solely from the employer, 20 % of training courses are initiated by both the employer and the worker. This might be a reflection of the work organization in Germany which is relying on more worker involvement than in the U.S. so that the worker is really the most qualified person to decide when additional skills for the job are needed. However, if this was important we ought to see a relationship between job position and the initiative for training. But employers seem to be only moderately more likely to initiate training of less skilled workers.

Table 9 presents results on the costs of the training to workers. The first panel displays sources of financial assistance which workers have received to cover monetary outlays. Again, employers are the most important source of financial assistance. Training sponsored by the UI office (which is primarily retraining, Fortbildung und Umschulung) is less important because the sample only includes workers employed when the training began. White collar and public sector workers are slightly more likely to pay for training themselves but the differences are not huge. Interestingly, there are no large differences between classes of workers when asked whether they would have participated even if they had to bear the costs themselves. There is a good degree of reluctance among workers to pay for training out of their own pocket and that is true independently of their occupational position. This reluctance is therefore unlikely to reflect inabilities to pay for training due to borrowing constraints.

Table 10 reports the benefits of the training as perceived by the participants. Training is mostly successful: 80 % of workers report a lot or some benefits from participating in a continuous education course. In interpreting these results, keep in mind that these reports are only for the course which the respondent has designated as the most important, so that these responses will be biased towards more positive ones. Benefits are especially large among semiskilled blue collar

workers and managers and professionals. The least benefits are reported by public servants which is the category receiving the most training.

The right panel in table 10 shows the types of benefits perceived by trainees. Multiple answers were possible and the percentages reported are unconditional; i.e. they are calculated for all respondents not just those feeling that training was beneficial. Only one of the categories, new skills for the current job, seems like a direct benefit to the firm. This presumably reflects higher worker productivity. 70 % of respondents feel that their training has resulted in such additional skills. All the other categories in the table are benefits that are benefits for the worker. The most important ones are that the work has become more interesting or that the opportunities for a promotion have risen. Each of these benefits is mentioned by slightly less than 20 % of the respondents with some concentration among blue collar workers. Higher wages are mentioned only by 10 %, primarily by the less skilled. Job security and greater ease of finding a new job are equally unimportant and again rather concentrated among the less skilled.

A first look at worker reports of the benefits from training seems to indicate that the large employer involvement may pay off in terms of higher productivity since this is the result of most of the training measures reported. Compare these results to worker's attitudes towards training (in table 2) and the perceived goals of the training (in table 9). For example, to qualify for a promotion is a reason to participate in training for 50 % of all employed respondents and the second most important mention among the reasons for potential participation. Only 29 % of respondents see such a qualification as the actual goal of the training and only 17 % feel that this is a tangible benefit. So due to employer involvement actual training outcomes might be geared more towards the firm's interests rather than the workers'. This is true even though the possibility of multiple answers obscures the prevalence of the benefits for the firm somewhat. I created two new variables: "new skills for the current job" is defined as a benefit to the firm and any mention of the remaining five categories (excluding "other benefits") as benefit to the worker. In this case, a cross-tabulation of these two categories among those reporting positive benefits reveals that 51 % of respondents felt that the training benefited only the firm. 41 % saw benefits for both the firm and themselves, and only 8 % felt that the benefits were purely in their own interest.

Table 11 probes somewhat deeper how the benefits relate to the circumstances of the training using the categorical variable for the success of the training. Since respondents could answer that they benefited a lot, somewhat or not all I used an

ordered probit model. I grouped the category "too early to tell" with no benefit. I also split the benefit variable up into benefits for the firm and for the worker again. Interestingly, most correlates that are related to more successful training for the firm also go hand in hand with more benefits to the worker. Receiving a written certificate is a strong predictor whether workers feel the training has been successful. There is a dichotomy in training of shorter and longer duration: short courses tend to benefit the employer and longer courses the worker. This may reflect the nature of training. Extensive training to gain a qualification for a better job often seems to be undertaken irrespective of its usefulness on the current job. In fact, Pannenberg (1996) reports that longer courses are more often associated with changing jobs in the future.

Training during work hours seems more successful than training during leisure time. It should be noted that many respondents among those reporting training during leisure hours perceived it as too early to know about any benefits. This might indicate that this type of training is simply a more long run investment with fewer immediate payoffs. However, the result holds up when limiting the sample to those workers who did not report that it was too early to decide on the benefits of the training. Training outcomes are felt to be superior if the training did not involve monetary costs for the worker. Workers who had to expend resources to receive the training may be more critical in judging the benefits: the answers could well refer to net benefits. In fact, the amount of money spent has a positive sign (and is significant at the 10 percent level) when included as an additional regressor. Who organizes the training is of minor importance. This seems to defy the notion that workplace based training is superior to school based training because employers can tailor the training better to the direct needs of the firm's operation. But the result is also at odds with the positive effect on training during work hours. In fact, it seems that all these results reflect more the costs of training to workers (in terms of time and money) rather than employer involvement. Another puzzling result is the effect of worker initiative. If workers took the initiative to participate in the training then they are more likely to report benefits to the firm but not to themselves.

To summarize this section, much of the training received seems to be geared towards the needs of employers. This manifests itself in workers reporting that they are actually able to do their jobs better. In return, firms seem to be willing to make the upfront investments in training: they pay for a large part of the monetary costs, they provide time off from regular work, and they often organize

the training themselves. Workers, on the other hand, are somewhat reluctant to pay for training out of their own pocket. This might suggest that most of the training we are observing here is highly firm-specific. However, two thirds of respondents claim to receive a certificate which seems to vouch for the portability of the training. Thus, these results do not quite seem to fall in line with the traditional models of training.

4. Training and Earnings Growth

The potential importance of on-the-job training for earnings growth over the life-cycle has long been emphasized by economists (Becker 1965, Mincer 1974). There has been much debate since as to whether wage growth related to general experience and to tenure with a particular employer is linked directly to human capital accumulation or can be explained by matching (Jovanovic 1979), backloading of wages due to the agency problem (Lazear 1979), or learning and insurance (Harris and Holmström 1982). A casual comparison of Germany and the U.S. suggests that human capital accumulation may be a major factor in earnings growth: the life-cycle path of earnings seems to be steeper in Germany than in the U.S. (see e.g. Krueger and Pischke 1995) and training is more prevalent in Germany. If this is true, then changes in earnings should be closely linked to training received by workers during their careers. The GSOEP data offer a good opportunity to test this hypothesis, and to measure the returns to training.

Similar studies, linking direct information on training to earnings growth have been undertaken for the U.S. by Brown (1989), Lynch (1992), and Bishop (1994) and by Blanchflower and Lynch (1994) for the U.K. These studies have had varied results but typically found significant returns to at least some types of training. The only studies of this type for Germany are by Pannenberg (1996), who also uses the GSOEP data.

My approach to the issue is fairly standard. If training enhances wage growth then training variables should have a significant effect in a standard wage equation over and above the wage growth due to general experience and tenure effects. In fact, including training variables in the regression should dampen wage growth related to experience and tenure if the claim is true that much of the life-cycle earnings growth is related to human capital accumulation. Unfortunately, much human capital accumulation is likely to be rather informal so that it might not be picked up by the GSOEP questions on continuous education courses. Neverthe-

less, if anything, these variables are likely to be positively correlated with other means of skill improvement so that we would expect to find a bigger effect than is attributable to formal training alone.

There are a number of complications to this exercise. First, there is the selection issue alluded to in the previous section. If workers with unobserved abilities get more training then we would see higher wages for workers who report more training. While I found above that such selection is unlikely to be very important I will concentrate on wage growth around the time of the training rather than levels. This will avoid any problems due to time invariant individual heterogeneity. I estimate fixed effect models of the form

$$\ln w_{it} = X_{it}\beta + \gamma T_{it} + \alpha_i + \epsilon_{it}$$

where X_{it} is a set of regressors like labor market experience and tenure with the current employer, T_{it} denotes that the worker has received training at some time *before* period t (since training should enhance earnings permanently), and α_i is a fixed person specific effect capturing all time invariant determinants of earnings.

There are good reasons why this model may be problematic. For example, high ability workers may receive more training and have higher wage growth from other sources as well. This would be the case in a model with learning about worker abilities (as in Jovanovic 1979) and specific training. In this case, γ would be overestimated because the training variable picks up some of the omitted wage growth of the high ability workers. This makes clear that it is important to control accurately for other potential sources of wage growth unrelated to training. In the regressions reported below I use a quartic in potential experience and a quartic in tenure to make sure that the training measure does not pick up omitted nonlinearities in wage growth (see Murphy and Welch 1990). In addition, I present results for the subsample of full-time German workers by gender, who should form more homogenous groups. Nevertheless, it is possible that a correlation between training and the growth rates of wages remains, so that the results may still be biased.

I use a sample that runs from 1986 to 1989, the year of the survey with the training questions. I focus on this time period because this is the time frame the training questions refer to, so my constructed training measures should be most accurate. The training variable I use is years of training received since the 1986 survey. Recall that individuals could report details on up to three courses. I constructed total training by converting the bracketed duration measure to a

continuous variable and adding up the resulting weeks for all of the reported courses. For any wave, the training refers to the cumulative amount since the 1986 survey.

There are some training spells which I observe starting before 1986 and ending after 1989. Omitting these will not bias my results. Any wage effects of training received before 1986 should be captured in the fixed effect α_i. Training after 1989 should not affect wages any earlier. Including the available training information before 1986 or after 1989, on the other hand, would lead to estimates that are biased downward since that information is certainly incomplete.

I distinguish between training obtained at the workplace and other training. I classify a training spell as the former if the individual reports that the training took place at least partly during work hours.[10] Following Lynch (1992) I distinguish between training with the present employer and training with previous employers. To do this I link the start of the training to the job in progress at that time. If the respondent has reported a job change since the start of the training I classify the training as referring to a previous employer. Since the training data are retrospective respondents may misreport exact dates. In fact, there are various instances in the data where individuals report starting on-the job training to learn the necessary skills for a new job (Einarbeitung) a few month *before* a job change. Since these cases obviously seem to refer to the new job, I matched this training to the new job if the start date of the course is up to three month before the start of the job. Note that the classification of training with current and previous employers means that a particular training spell may change from referring to a current employer to a previous employer as an individual switches jobs during the sample.

According to standard human capital theory, training during work hours that ultimately benefits the worker should be paid for by the worker by accepting a lower current wage. I experimented with a variable capturing the number of hours of training during the month before the survey but coefficients on this variable always turned out to be very close to zero and completely insignificant. These results are not reported below.

A final data issue refers to the earnings variable. Monthly earnings are reported

[10]The information on whether the employer was the organizer of the training is only available for one of the three courses reported in the survey. Pannenberg (1996) exploits that information more fully; the cost of this is that he can only look at one training spell per worker. Our results are very similar.

as of the month prior to the interview. However, not all individuals work the same number of hours and training tends to be more prevalent among full time workers. I include a dummy for full-time in the regressions. Results using the logarithm of weekly hours as a regressor were very similar. This is admittedly problematic since hours are endogenous if individuals choose hours according to labor supply theory. An alternative would be to use hourly wages by dividing monthly earnings by hours. However, it is not really clear what the resulting wage measure means for salaried workers who do not get paid for overtime.[11]

The results are presented in tables 12 and 13.[12] The first column in table 12 shows results for a baseline specification only including the quartics in experience and tenure and the full time dummy. All the nonlinear terms are significant. The next column includes total training as an additional regressor. The variable is specified in years so that the coefficient directly yields the annual return which is about 3 % and is significant at the 7 % level. The (cross-sectional) return to a year of full time schooling in these data is close to 8 % (Krueger and Pischke 1995). A lower return on continuous training would not be surprising since on average workers only spend 20 hours a week in training. Thus, if the training coefficient indeed reflected the true return, these results would imply that the returns to continuous training are only slightly less than the returns to schooling, apprenticeships, or similarly formal education.

It is unlikely that this is the whole story. Column (3) includes the additional variables training with the current employer and with previous employers. The coefficient on total training is now the return to training during leisure hours while the return to employer provided training is the sum of the coefficients on total training and training with an employer. The interaction variables are both negative, indicating lower earnings growth for employer provided training, but both are also insignificant. The return to training during leisure time has risen by about 30 %. This is consistent with most workplace training being financed

[11]A significant fraction of German workers receive one-time annual bonuses (e.g. a "13th salary"). These should be included in a correct earnings measure. While they are available in the GSOEP for the previous year I have not link them to the current job. Omitting these bonuses will tend to bias the returns to training downwards if additional training increases the likelihood of obtaining such payments or the size of the bonus. Trained workers being more likely to receive bonuses in general will not bias the fixed effects results.

[12]These regressions use the 1989 cross section weights for all years since respondents had to present in the 1989 sample to be asked the training questions. Using the 1986 to 1989 cross section weights for each year yielded similar results.

by employers, so that this training also does not lead to higher wages. The returns to training financed by workers themselves is positive, on the other hand. Unfortunately, these effects are very imprecise. Therefore, I limit myself to the total training measure in the following columns.

A potential problem is that training might occur particularly frequently at times of job changes. But job changes could also lead to wage growth for other reasons like job matching. I therefore include a dummy variable for previous job changes. Since these effects on earnings ought to be permanent this variable is one for all years after an individual switched employers. Adding a second variable for multiple job changes, which are rare, changes little. Furthermore, some individuals increase their level of formal schooling during the sample period (and this could reflect continuous training as in the case of a master craftsman course but this need not be the case). I therefore also include a variable for years of formal schooling and training (see Pischke 1993 for details on how this is constructed). There are very few individuals in the sample for whom the level of schooling changes; continuous training is about 15 times as likely. Nevertheless, the coefficient on years of education is 5 % and significant. The lower return compared to a cross-section might be due to the effect that returns to education might be lower for those increasing their schooling after their initial labor market entry.

The coefficient on job changes is also positive. Notice that the identification of separate experience, tenure, and job change effects is rather tenuous in fixed effect regressions. Within single jobs, the linear portion of tenure and experience is perfectly collinear so that the separate coefficients are identified off the subsample of job switchers only. Adding the job change dummy means that the identification of experience and tenure now relies on the frequency and timing of job changes during the life-cycle only. Still, in this sample the separate experience, tenure, and job change effects are all significant and the coefficient on training only drops slightly.

These returns to training may be biased if training duration is correlated with wage growth for other reasons. For example, women tend to have steeper age-earnings profiles than men, but they receive less training. Similarly, foreigners may have higher earnings growth due to assimilation (although there is little evidence for this in this dataset, see Pischke 1993). Therefore, I limit the sample to more homogeneous groups in table 13. This table presents results for full–time employed Germans by gender. Looking at column (1) for men, both the job

change dummy and the training variable become small, negative, and completely insignificant. The collinearity of experience, tenure, and job changes now presumably prevents accurate estimation of separate effects on each of these. This could mean either of two things. Either the model is so overparameterized now that it becomes hard to get a reliable estimate of the return to training. Alternatively, the training variable was picking up higher wage growth for German male full time workers in the previous regressions but there is no actual wage effect of training (in fact the experience profile estimated for the subsample is slightly steeper than for the full sample in the previous columns). I tend to favor the second explanation. One reason is that the accuracy of the coefficient on training as evidenced by its standard error has changed little. Another reason is that the return to school based education is still basically unchanged. Since many fewer individuals obtained more formal schooling compared to training, the return to schooling estimate ought to be even more fragile. Measurement error in the training variable would bias the training coefficient downwards but this is also true in the previous regressions. Furthermore, classical measurement error cannot explain why the coefficient becomes negative now. Since none of these alternative explanations give as consistent a story I tend to believe that the results for the male subsample actually reflect the true returns to training more accurately.

For women the findings in column (4) are very different. Their return to training is 6.3 %, although not significant due to the small sample size. The return to formal schooling is around 5 %, very similar to men. Furthermore, there is a sizeable wage effect of job changes for women.

Finally, I present results which relax constant returns to training of any duration. Columns (2) and (5) introduce simply a dummy variable when a worker has participated in any training. The effects are about 2 % for men, and just below the conventional significance level, and 5 % and significant for women. These are sizeable returns, especially for women, since most training spells are relatively short. In columns (3) and (6) I tried a more non–parametric specification for the duration of training. Unfortunately, there is not enough variation especially among small spells to get meaningful estimates. However, the basic picture emerges that returns are high for short spells, while there is little additional return to participating in longer training courses.

The findings in this section are somewhat easier to reconcile with the standard theory of training than the results based on the self-reported benefits above. This is especially true for women. Curiously, when I break up the results in table 10

by gender I do not find that women report higher wages more often as a benefit. In addition, other puzzles remain. Longer training spells seem to have rather low returns, especially for men. This might be due to the fact that these might be qualifications for a new job and therefore do not show up within the three year window analyzed here. Another puzzle is the strong disparity in the findings for men and for women. One possible explanation is that pay setting for women is different than for men. Notice the virtual absence of a tenure–wage profile for women, while this is quite pronounced for men. This may be due to the higher attachment of men to the labor force and to their employer, which makes long–term contracts and seniority based compensation systems feasible. Women may get rewarded more directly for productivity enhancing training while the rewards for men are less explicit but built into the wage profile.

5. Conclusion

Using the training reported in the GSOEP, about 200 million man-hours were spent in continuous training in the German economy during 1988. That amounts to about 0.5 % of the total man-hours worked. Presumably, this estimate even understates the true scope of continuous training since information is not available on all training spells. This training is distributed rather unequally throughout the economy. Few workers receive a disproportionate share of the training. In particular, continuous training is more prevalent among those who possess more skills to begin with. Skill enhancement in the workplace is obviously not a means that tends to even out existing skill differentials but rather exacerbates them.

Much of the continuous training in Germany is provided by employers and takes place during work hours. This strong employer involvement in training in Germany is one of the main results of this paper. It coincides with an apparent reluctance of workers to get training outside the workplace. While many workers report interest in training, they seem rather unwilling to expend resources of their own to receive more training. This is consistent with the evidence on small wage gains for men. A relatively coherent story therefore emerges from these data for men: firms are the main organizers of training pay for the investment costs. They also reap the benefits from training through higher productivity of their workers. Workers may benefit indirectly from the training through wage increases that are part of their pay package over time, but these increases aren't directly tied to training and who receives it. Workers themselves do not invest in training

because it is hard for them to appropriate the returns. While this sounds like the prototypical story told for firm-specific training, the evidence on certificates received for the training seems to indicate that a large part of the skills obtained are general and portable to other employers.

So why are workers unable to switch jobs and obtain positive returns to their training elsewhere as the Becker model suggests? Recent research by Daron Acemoglu (1996) and by Acemoglu and myself (1996) on training in imperfect labor markets tries to provide systematic explanations for these phenomena. The basic stories we are telling are based on two ingredients: if workers do not receive their marginal product, and if the labor market imperfections lead to a compression of the returns to training, then workers do not have the right incentives to invest. On the other hand, the rents which firms can collect are tied to the skill levels of workers, so that firms have an incentive to undertake investments even in general skills. The conditions for firm sponsored general training are likely to be more prevalent in Germany, due to a more compressed wage structure and labor market institutions which limit flexibility. However, this by itself does not explain a higher incidence of training in Germany than in the U.S. Workers in the U.S. should have more incentives to invest in training themselves, possibly based in schools, if the U.S. labor market is closer to the competitive model. Liquidity constraints may possibly prevent this. In addition, in Acemoglu and Pischke (1996) we present a model that yields multiple training equilibria even for the same parameters. The U.S. may simply be in a low training equilibrium where the returns to training look high (as in Lynch 1992), and vice versa, Germany is in a high training equilibrium with low returns.

However, the results in this paper also indicate that things are likely to be a bit more complicated. One puzzle is that the estimated returns to training are much higher for women than for men. Another finding for which I lack a complete explanation is the fact that returns seem to be highly non–linear in the duration of training. These results will need further scrutiny.

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Table 1
Attitudes Towards Participation in Continuous Training by Job Postion
(in Percent)

Job Position	Any Interest in Training	Reasons Might Participate (Those Interested in Training)						Reasons Not to Participate (All Respondents)		
		Get Degree	Learn New Occupation	Refresh Old Skills	Adapt to Changes	Qualify for Promotion	Learn About New Areas	Does not Help with Job	No Time	Costs
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Unskilled Blue Collar	29	26	47	27	40	46	39	55	48	68
Semiskilled Blue Collar	37	9	29	32	44	42	35	52	56	76
Skilled Blue Collar	60	4	14	39	62	57	38	47	48	68
Foremen	66	5	3	43	75	53	27	48	40	58
Self-Employed	57	4	6	53	74	24	36	48	66	42
Simple White Collar	64	11	22	40	61	46	41	44	57	69
Skilled White Collar	83	4	11	51	76	57	42	33	39	49
Managers and Professionals	86	3	2	57	88	57	48	31	39	32
Public Sector Low Rank	83	6	19	58	69	60	38	43	30	41
Public Sector Higher Rank	87	4	3	56	83	56	31	39	29	35
Public Sector Upper Rank	92	4	6	77	76	33	36	38	35	21
Total	66.0	5.7	13.0	48.7	70.5	50.3	39.8	42.3	46.9	45.4
Number of Observations	4763	2762	2762	2762	2762	2762	2762	4557	4544	4531

Note: Sample includes respondents employed in 1989, job position refers to 1989.

Table 2
Training by Job Position
(in Percent)

Job Position	Participated in Any Training	Among Those Participating					Unconditional Duration (weeks)
		1 Course	2 Courses	3 or More Courses	Training Employer Sponsored	Duration (weeks)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Unskilled Blue Collar	4	62	0	38	74	9.2	0.4
Semiskilled Blue Collar	6	53	28	19	80	17.1	1.5
Skilled Blue Collar	16	37	33	30	73	23.6	4.3
Foremen	15	20	15	65	76	9.2	1.7
Self-employed	18	28	22	50	63	5.0	1.2
Simple White Collar	17	32	35	33	80	12.3	2.6
Skilled White Collar	37	28	19	53	79	11.0	5.5
Managers and Professionals	55	26	10	64	84	6.9	4.9
Public Sector Low Rank	49	28	19	53	98	9.9	7.4
Public Sector Higher Rank	63	20	22	58	98	9.5	10.1
Public Sector Upper Rank	61	26	25	49	96	3.1	4.1
Total	27.6	29.0	20.3	50.7	82.4	10.2	3.8
Number of Observations	4154	909	909	909	929	911	4154

Note: Sample includes respondents employed in 1986, job position refers to 1986. Duration among those participating refers to the most important course. Unconditional duration adds durations for all courses attended.

Table 3
Training by Occupation
(in Percent)

ISCO-Code	Occupation	Percent Receiving Training
8	Mathematical and computer scientist	72
6	Physicians, pharmacists	69
13	Teachers	60
2	Engineers	53
70	Shop floor supervisors	53
58	Security personnel	52
19	Social Scientists	49
3	Technicians	43
31	Administrative workers	42
33	Accountants	40
43	Technical sales workers	36
39	Secretaries, clerical	35
21	Executives, managers	32
85	Electrical mechanics	31
57	Hairdressers, cosmetologists	29
44	Insurance sales workers	29
7	Nurses, medical personnel	24
84	Mechanics	23
45	Sales workers	20
83	Blacksmith, tool and die makers	15
72	Steel and metal makers	15
92	Printers	14
74	Chemical workers	13
61	Farmers	12
87	Plumbers and welders	12
53	Cooks, waiters	11
97	Material moving equip. operators	10
77	Food production workers	9
98	Motor vehicle operators	9
55	Janitors, cleaners	8
99	Laborers	8
95	Construction workers	7
93	Painters	2
81	Woodworkers	0
79	Apparel makers, tailors	0

Note: Sample size is 4097. Sample includes respondents employed in 1986. Occupation refers to 1986.

Table 4
Training by Industry
(in Percent)

Industry	Participated in Any Training	Among Those Participating		Unconditional Duration (weeks)
		Training Employer Sponsored	Duration (weeks)	
	(1)	(2)	(3)	(4)
Agriculture	17	81	14.0	2.6
Energy	34	85	1.2	0.7
Mining	10	100	3.4	1.5
Chemical	33	94	6.4	3.8
Plastics	24	83	20.1	5.3
Stone, Clay, Glass	19	61	20.2	3.8
Steel	22	86	17.9	4.5
Machinery	27	66	23.2	7.4
Electric	35	72	15.2	5.9
Wood	6	65	41.9	2.5
Textile	7	49	37.1	3.0
Food	17	83	4.6	1.4
Construction	16	72	13.8	2.7
Trade	22	78	12.9	3.3
Mail, Railway	38	96	7.0	3.4
Other Transport	21	92	2.9	1.0
Banks	33	89	3.9	1.5
Insurance	49	84	13.8	7.2
Services	14	62	1.2	0.3
Education	47	91	6.6	5.5
Health	26	46	5.2	1.4
Legal	31	83	10.8	7.5
Nonprofit	52	88	2.6	3.7
Government	42	96	9.1	5.1
Total	28.2	82.4	10.4	3.9
No. of observations	3777	864	848	3777

Note: Sample includes respondents employed in 1986, industry refers to 1986. Duration among those participating refers to the most important course. Unconditional duration adds durations for all courses attended.

Table 5
Training by Firmsize
(in Percent)

		Among Those Participating					
	Participated in Any Training	1 Course	2 Courses	3 or More Courses	Training Employer Sponsored	Duration (weeks)	Unconditional Duration (weeks)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Self-Employed	10	39	6	55	69	5.7	0.7
<20	20	35	19	47	62	9.2	2.2
20 - 200	25	33	21	46	81	13.7	4.4
200 - 2000	27	37	21	41	85	9.4	3.6
2000+	40	22	21	57	92	9.6	5.3
Total	27.1	30.2	20.4	49.4	81.9	10.5	3.8
Number of observations	4518	973	973	973	994	976	4518

Note: Sample includes respondents employed in 1986, firm size refers to 1986. Duration among those participating refers to the most important course. Unconditional duration adds durations for all courses attended.

Table 6
Training Incidence and Duration

Independent Variable	Linear Probability Model		Tobit	
	Participated in any Training	Training Employer Sponsored	Number of Weeks	Number of Hours
	(1)	(2)	(3)	(4)
Mean of the Dependent Variable	0.23	0.19	3.19	48.5
Years of Schooling in Germany	0.015*	0.013*	0.96*	18*
	(0.006)	(0.005)	(0.43)	(9)
Years of Schooling outside Germany	0.003	0.006	1.14	22
	(0.006)	(0.006)	(1.51)	(30)
Potential Experience	-0.007	-0.007	-0.83*	-28*
	(0.004)	(0.004)	(0.34)	(7)
Potential Experience Squared/100	-0.002	0.003	-0.73	15
	(0.007)	(0.007)	(0.77)	(15)
Female	-0.065*	-0.059*	-8.4*	-218*
	(0.025)	(0.023)	(2.1)	(44)
Part-time	-0.024	-0.014	1.4	-37
	(0.027)	(0.025)	(3.0)	(60)
Foreigner	0.053	0.046	-18.0	-274
	(0.051)	(0.050)	(12.9)	(252)
Semi-skilled	-0.010	-0.013	9.9	87
	(0.022)	(0.021)	(8.5)	(169)
Skilled	0.031	0.010	24.5*	387*
	(0.030)	(0.028)	(8.2)	(162)
Foreman	0.061	0.041	22.4*	416*
	(0.044)	(0.038)	(9.7)	(191)
Self-employed	0.163*	0.116*	36.4*	581*
	(0.044)	(0.038)	(8.7)	(172)
Simple White Collar	0.048	0.040	22.3*	426*
	(0.034)	(0.032)	(8.4)	(165)
Skilled White Collar	0.224*	0.183*	42.2*	798*
	(0.031)	(0.029)	(8.0)	(159)
Managers/Prof.	0.346*	0.295*	44.9*	785*
	(0.047)	(0.047)	(8.4)	(165)
Public/Low Rank	0.244*	0.251*	42.0*	781*
	(0.058)	(0.058)	(8.7)	(171)
Public/Higher Rank	0.376*	0.392*	50.8*	846*
	(0.061)	(0.061)	(9.0)	(177)
Public/Upper Rank	0.343*	0.352*	41.1*	808*
	(0.077)	(0.076)	(9.4)	(186)

continued

Table 6
Training Incidence and Duration

(continued)

Independent Variable	Participated in any Training	Training Employer Sponsored	Number of Weeks	Number of Hours
	(1)	(2)	(3)	(4)
Firm Size 20 - 200	0.040 (0.028)	0.054* (0.024)	8.4* (3.0)	115 (60)
Firm Size 200 - 2000	0.045 (0.028)	0.077* (0.025)	8.0* (3.2)	127* (63)
Firm Size > 2000	0.114* (0.029)	0.147* (0.026)	13.2* (3.0)	258* (60)
Firm Size Missing	0.201 (0.144)	0.141 (0.136)	12.5 (10.7)	286 (211)
R^2 or Pseudo R^2	0.241	0.239	0.060	0.042

Note: Sample size is 3447. Sample includes those employed in 1986. Employment related regressors refer to 1986. The regressions also include a constant and 19 industry dummies.

Table 7
Type of Training by Job Position
(in Percent)

Job Position	Goals of the Training					Received Certificate
	Learn New Occupation	OJT at New Job	Qualification for Promotion	New Skills for Current Job	Other	
	(1)	(2)	(3)	(4)	(5)	(6)
Unskilled Blue Collar	-	-	-	-	-	-
Semiskilled Blue Collar	15	15	40	32	21	63
Skilled Blue Collar	3	4	41	59	3	77
Foremen	-	-	-	-	-	-
Self-Employed	0	0	17	72	25	68
Simple White Collar	6	15	45	61	9	68
Skilled White Collar	1	5	31	70	9	62
Managers and Professionals	1	7	29	73	13	52
Public Sector Low Rank	4	23	22	65	5	57
Public Sector Higher Rank	0	3	15	72	18	61
Public Sector Upper Rank	0	5	19	81	17	64
Total	2.0	6.8	29.0	68.5	12.1	61.9
Number of observations	927	927	927	927	920	901

Note: Sample includes respondents employed at the start of the training. Job position refers to the job at the start of the training.

Table 8
Employer Involvement in Training by Job Position
(in Percent)

Job Position	Training During Work Hours?			Organizer of Training				Initiative for Training		
	Work Hours	Partly	Leisure	Employer	Business Association	Private Firm	Other	Worker	Employer	Both
	(1)	(10)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Unskilled Blue Collar	-	-	-	-	-	-	-	-	-	-
Semiskilled Blue Collar	72	13	15	69	19	8	5	38	37	25
Skilled Blue Collar	50	12	38	41	30	12	17	50	32	18
Foremen	-	-	-	-	-	-	-	-	-	-
Self-Employed	45	16	39	16	46	19	19	87	11	2
Simple White Collar	59	13	28	56	18	12	14	38	39	23
Skilled White Collar	61	9	29	54	16	13	17	54	25	21
Managers and Professionals	72	11	17	48	16	23	14	50	23	27
Public Sector Low Rank	84	6	9	94	2	0	4	31	57	12
Public Sector Higher Rank	68	16	16	81	6	11	3	60	15	25
Public Sector Upper Rank	68	12	20	82	2	0	16	63	18	19
Total	64.0	11.0	25.0	55.6	17.4	13.2	13.7	53.6	26.0	20.5
Number of Observations	901	901	901	925	925	925	925	922	922	922

Note: Sample includes respondents employed at the start of the training. Job position refers to the job at the start of the training.

Table 9
Costs of Training by Job Position
(in Percent)

	Source of Financial Assistance					Participate Without Assistance?		
	None	Employer	UI Office	Other	Own costs Zero?	Yes	Maybe	No
Job Position	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Unskilled Blue Collar	-	-	-	-	-	-	-	-
Semiskilled Blue Collar	21	67	8	4	60	37	23	40
Skilled Blue Collar	22	58	18	2	57	36	34	30
Foremen	-	-	-	-	-	-	-	-
Self-Employed	84	11	2	4	29	44	27	30
Simple White Collar	30	59	11	0	70	37	45	19
Skilled White Collar	31	63	6	0	74	36	33	30
Managers and Professionals	30	66	5	0	78	36	35	29
Public Sector Low Rank	21	78	0	0	74	39	22	39
Public Sector Higher Rank	33	67	0	0	82	39	31	30
Public Sector Upper Rank	35	65	0	0	72	38	49	13
Total	33.0	60.5	5.8	0.7	69.9	36.9	34.1	29.0
Number of observations	925	925	925	925	919	630	630	630

Note: Sample includes respondents employed at the start of the training. Job position refers to the job at the start of the training.

Table 10
Perceived Benefits from Training by Job Position
(in Percent)

Job Position	Has Training Been Successful?				What Are the Benefits of Training?						
	Very	Somewhat	No	Too Early to Tell	New Skills for Current Job	Possibility of Promotion	Higher Wage	More Job Security	More Interesting Work	Easier to Find New Job	Other
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Unskilled Blue Collar	-	-	-	-	-	-	-	-	-	-	-
Semiskilled Blue Collar	48	51	0	0	81	40	29	38	40	10	18
Skilled Blue Collar	31	36	10	23	61	17	14	27	20	7	1
Foremen	-	-	-	-	-	-	-	-	-	-	-
Self-Employed	33	53	4	10	73	8	15	13	17	7	20
Simple White Collar	32	43	8	17	61	20	11	9	18	14	8
Skilled White Collar	38	42	8	13	68	18	11	15	16	10	5
Managers and Professionals	47	37	9	7	76	21	8	12	15	11	5
Public Sector Low Rank	33	44	12	11	59	14	9	2	14	2	18
Public Sector Higher Rank	38	43	14	6	74	7	1	0	27	0	13
Public Sector Upper Rank	22	60	6	12	78	5	0	0	8	1	6
Total	37.2	42.5	8.6	11.8	69.5	16.6	9.8	12.3	17.2	7.9	7.5
Number of Observations	915	915	915	915	915	915	915	915	915	915	915

Note: Sample includes respondents employed at the start of the training. Job position refers to the job at the start of the training.

Table 11
Ordered Probits for Training Benefits

Independent Variable	Any Benefit	Benefit for the Firm	Benefit for the Worker
	(1)	(2)	(3)
Duration (in Weeks)	-0.0027 (0.0016)	-0.0071* (0.0017)	0.0068* (0.0017)
Training During Work Hours	0.40* (0.09)	0.36* (0.09)	0.26* (0.10)
Training Partly During Work Hours	0.23 (0.12)	0.29* (0.12)	0.32* (0.14)
Received Certificate	0.20* (0.07)	0.24* (0.07)	0.55* (0.08)
Organizer: Employer	0.11 (0.11)	0.07 (0.11)	-0.02 (0.12)
Organizer: Business Association	0.07 (0.12)	0.10 (0.12)	-0.23 (0.13)
Organizer: Private Firm	0.08 (0.13)	0.10 (0.13)	-0.02 (0.14)
Initiative: Worker	0.21* (0.09)	0.17* (0.09)	-0.05 (0.10)
Initiative: Worker and Employer	0.21* (0.10)	0.21* (0.10)	-0.02 (0.10)
No Costs to Worker	0.31* (0.08)	0.30* (0.08)	0.23* (0.09)
Number of Observations	1170	1130	1170

Note: Sample includes respondents employed at the start of the training. Job position refers to the job at the start of the training.

Table 12
Fixed Effects Log Earnings Regressions: 1986 - 1989
(Standard Errors in Parentheses)

Independent Variable	(1)	(2)	(3)	(4)
Years of Schooling	---	---	---	0.050*
				(0.019)
Potential Experience	0.104*	0.103*	0.103*	0.091*
	(0.010)	(0.010)	(0.010)	(0.010)
Pot. Exp.^{2} x 10^{-2}	-0.393*	-0.393*	-0.395*	-0.353*
	(0.082)	(0.082)	(0.082)	(0.082)
Pot. Exp.^{3} x 10^{-4}	0.817*	0.824*	0.830*	0.751*
	(0.244)	(0.244)	(0.244)	(0.244)
Pot. Exp.^{4} x 10^{-6}	-0.650*	-0.659*	-0.644*	-0.604*
	(0.244)	(0.244)	(0.244)	(0.243)
Tenure	0.017*	0.017*	0.017*	0.023*
	(0.004)	(0.004)	(0.004)	(0.005)
Tenure^2 x 10^{-2}	-0.236*	-0.236*	-0.236*	-0.282*
	(0.059)	(0.059)	(0.059)	(0.059)
Tenure^3 x 10^{-4}	0.902*	0.899*	0.899*	1.037*
	(0.257)	(0.257)	(0.257)	(0.257)
Tenure^4 x 10^{-6}	-1.034*	-1.029*	-1.029*	-1.173*
	(0.342)	(0.342)	(0.342)	(0.342)
Job Change	---	---	---	0.074*
				(0.013)
Full Time	0.384*	0.384*	0.384*	0.383*
	(0.011)	(0.014)	(0.014)	(0.014)
Total Training (in Years)	---	0.031	0.042*	0.023
		(0.017)	(0.021)	(0.017)
Training with Current Employer	---	---	-0.036	---
			(0.040)	
Training with Previous Employer	---	---	-0.022	---
			(0.056)	
No. of Observations	15547	15547	15547	15547
No. of Individuals	4818	4818	4818	4818

Note: Unbalanced sample including employed respondents. See text for further information.

Table 13
Fixed Effects Log Earnings Regressions: 1986 - 1989
Full-time Employed Germans Only
(Standard Errors in Parentheses)

	Men			Women		
Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)
Years of Schooling	0.043*	0.036	0.041	0.056	0.051	0.049
	(0.027)	(0.028)	(0.028)	(0.038)	(0.038)	(0.038)
Potential Experience	0.124*	0.122*	0.123*	0.115*	0.108*	0.109*
	(0.016)	(0.016)	(0.016)	(0.023)	(0.023)	(0.023)
Pot. Exp.^{2} x 10^{-2}	-0.427*	-0.433*	-0.437*	-0.639*	-0.606*	-0.618*
	(0.128)	(0.128)	(0.128)	(0.200)	(0.200)	(0.200)
Pot. Exp.^{3} x 10^{-4}	0.786*	0.810*	0.816*	1.766*	1.662*	1.696*
	(0.388)	(0.388)	(0.389)	(0.643)	(0.643)	(0.643)
Pot. Exp.^{4} x 10^{-6}	-0.555	-0.575	-0.578	-1.629*	-1.514*	-1.543*
	(0.399)	(0.399)	(0.399)	(0.687)	(0.686)	(0.687)
Tenure	0.014*	0.014*	0.014*	0.011	0.010	0.011
	(0.005)	(0.005)	(0.006)	(0.010)	(0.010)	(0.010)
Tenure^2 x 10^{-2}	-0.208*	-0.201*	-0.201*	-0.104	-0.097	-0.110
	(0.070)	(0.070)	(0.070)	(0.146)	(0.145)	(0.146)
Tenure^3 x 10^{-4}	0.809*	0.776*	0.778*	-0.051	-0.071	-0.020
	(0.298)	(0.299)	(0.299)	(0.647)	(0.646)	(0.647)
Tenure^4 x 10^{-6}	-0.937*	-0.898*	-0.902*	0.353	0.360	0.304
	(0.391)	(0.392)	(0.391)	(0.870)	(0.869)	(0.870)
Job Change	-0.004	-0.003	-0.003	0.063*	0.059*	0.057
	(0.016)	(0.016)	(0.16)	(0.029)	(0.029)	(0.029)
Total Training (in Years)	-0.012	---	---	0.063	---	---
	(0.019)			(0.038)		
Participated in Any Training	---	0.018	0.021	---	0.050*	0.032
		(0.009)	(0.012)		(0.018)	(0.022)
Training Spells Lasting 8 Weeks or Less	---	---	-0.004	---	---	0.495
			(0.177)			(0.357)
Training Spells Lasting More than 8 Weeks	---	---	-0.024	---	---	0.040
			(0.020)			(0.041)
No. of Observations	7018	7018	7018	2612	2612	2612
No. of Individuals	2081	2081	2081	932	932	932

Note: Unbalanced sample including employed German respondents working more than 35 hours a week. See text for further information.