# Extended Abstract

# Training, Mobility, and Wages

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# 1 Introduction

This paper considers training, mobility decisions and wages together. In line with most researchers, we believe that training is important for human capital formation which itself is a determinant of labor productivity. Facing the high training intensity, e.g. in Germany as compared to the U.S. (see Acemoglu and Pischke (1998)), training seems to be important especially in continental Europe. We choose Becker's human capital theory Becker (1962) as a benchmark, where training is understood as an investment in human capital which affects the productivity of individuals. Extending Becker's arguments, whether this increment in productivity will also lead to increased wages, depends on the rent sharing between employer and employee (see e.g. Booth, Francesconi, and Zoega (1999)). The more firm specific the training is, the more likely it is that the employer will reap a large part of the rent and hence, the increase in wage will be lower than the increase in productivity. Empirically, training should have discrete and measurable effects on observable labor market outcomes, specifically on wages and employment. Wage effects of training on earnings have been examined and discussed extensively (see e.g. Kuckulenz and Zwick (2003) and Büchel and Pannenberg (2004) for Germany), mobility effects less so.

Therefore, one focus of this paper is the effect of participation in training on the mobility decision after training. The mobility decision is important since investment in training might be strongly affected by mobility in two ways. On the one hand, training can encourage worker mobility. First, if training is general and has increased the general productivity and earnings to a lesser extent (i.e. there is rent sharing), an individual might change the job in order to be adequately paid after training participation. Second, in case training helps to detect bad matches, workers are on average more likely to seek another job. On the other hand, training can hamper mobility if it is firm-specific, i.e. if non-transferable skills were imparted. In this case, workers' productivity only increases in one firm and incentives to search for a job in another firm will be smaller.[1] So, mobility after training can be a desired result. But anticipated

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[1] Recognize that a correlation between training and mobility is not necessary a causal effect, since there might be a specialization decision between training and search (see Antel (1986)) or there might be a „hobo syndrome" which implies high mobility and prevents individuals from being trained (see Judge and Watanabe (1995), Light and McGarry (1998) and Munasinghe and Sigman (2004)).

labor mobility after training can also hinder the investment of firms. If firms (partly) finance general training, they benefit from this investment only if workers stay in the firm. If worker mobility after training is high, firms' investments in general training will be low. In the latter case, the specificity of training itself can be used by firms to restrict the mobility of workers. After firm-specific training, the job match might have improved and hence, the incentive to search for a better match can be lower. We analyze in this paper whether individuals that have received training are more or less mobile than individuals that have not received any training. This will be an indicator for the degree of specificity of the training. Or, observationally equivalent, if mobility is high after training, bad matches have been detected. In the first case, the productivity is higher, while in the second case the productivity prediction is more precise.[2] Another focus of the paper and closely linked to the first question are wage effects of mobility, distinguishing whether people have participated in training before or not. This is interesting because a job change to a new firm reveals something about the skills of an individual that are transferable across firms. Comparing training participants and non participants which have changed jobs discloses whether training is useful in other firms or to which extent it can be used. In addition, we test whether workers who change their job after training are paid more than those workers which do not change their job after training.[3] A ,,high" wage of involuntary job movers after training may indicate that employers share the costs and returns to general training. A lower wage of job movers, in contrast, might indicate that firm specific skills are lost and productivity in the new firm is lower. Equivalently it might indicate that individuals have lost the effect from the self-selection in higher paying jobs (wage ladder effect), or, that bad matches are wedded out.

In line with Fitzenberger and Spitz (2004) we argue, that training may inhibit an occupation specific component. Therefore, we also compare wage mobility effects (after training and without training) for simple job (≡employer) changes and occupational changes. Finally, it might even be, that training has a task-specific component. Using information on major changes in tasks and wages also allows us to assess wage effects of changes in tasks after training.

In addition, we examine whether individuals that have just changed jobs, must be trained at the beginning of their job, as argued in Brown (1989). The alternative hypothesis is that firms wait until they decide whether to invest in training to ensure a good match first. Heterogeneity in mobility and productivity of the individuals can be responsible for this behavior on the side of the firm.

Having a closer look at mobility, we distinguish a broad and a narrow definition of job mobility. In a narrow sense, mobility refers to a change of the employer, which we call loosely a job change. In a broad sense, mobility also includes occupational changes and major changes of tasks that are not associated with a change of the employer. An important distinction in the econometric application is between mobility induced by

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[2]Closely related, Nagypál (2004) tries to distinguish empirically between the experience good property of jobs and learning by doing. She finds that at the outset of the job, learning–by–doing seems to dominate, while afterwards learning about match quality seems to be more important.

[3]In the terminology of the treatment literature, we have multiple treatments, training and mobility, where the selection in the first treatment (training) might influence the selection in the second treatment (mobility) and where the effect of both treatments might be different from the combination of the two single treatments.

the individual (voluntary job change) and mobility induced by the firm (involuntary job change). Hence we distinguish mobility effects of voluntary mobility on wages from mobility effects of involuntary job mobility, since in the former case we have a typical problem of simultaneity. To see this, recognize that from the point of view of search theory the decision to change a job is made on the basis of the current wage and the outside wage offer. Hence, wage and job mobility are determined simultaneously. Still, involuntary job mobility is not enough to guarantee exogeneity of the job change variable with respect to the wage. Using information about firm closures helps us to identify the wage effect of exogenous and involuntary mobility, while using the explicit information on voluntariness of the job change allows us to detect voluntary job (and occupational) changes.

# 2  Mobility

Standard competitive human capital theory predicts that neither general nor (employer, occupation or task) specific skills should have mobility effects, since individuals are paid their outside option. Negative mobility effects of training in specific skills, however, can be explained by rent-sharing arguments. That is, individuals are paid above their outside option. A firm might rise wages in order to prevent individuals from being mobile or there might simply be a hold-up problem. That is, an individual is able to extract ex-post a part of the (quasi-)rent by renegotiating after the cost of training are sunk. Assuming that some sort of rent-sharing exists, that is, individuals capture a non-zero part of the return to investment in training, we expect that specific training tends to reduce mobility. If training provides individuals with general skills, this should not alter the mobility decision in a competitive market. If, however, the market is not competitive, the effect on mobility is less clear. Mobility may not be unaffected by investments in general skills since market imperfections can turn technologically general into de facto specific skills (see Acemoglu and Pischke (1999)). This is the case, for example, if the outside wage offer (distribution) does not increase one by one with (the productivity effect of) general skills or if there are other objections to mobility that are connected with training. Then, not only investments in firm specific training, but also investments in general training might reduce mobility.

Informational imperfections arise in various forms. Nelson (1970) distinguishes two sorts of informational imperfections: inspection and experience goods. In the tradition of Jovanovic (1979), jobs are seen as experience goods, which means that the quality of a job match can only be experienced over time as information reveals slowly. This yields another interpretation of why training takes place in firms (see Felli and Harris (1996)). Thinking, for example, about trainee-programmes, it is intuitive to assume that there is not only a productivity effect but also a monitoring effect for both sides to detect whether the match is a good one or not, which otherwise could only be revealed over time. This is interesting for both the employer and the employee, since valuable time is saved for both sides of the market. Information about match quality can be seen as a generic form of specific capital, since it concerns only the quality of the present match. From this point of view, we expect a positive impact of training on mobility for one part of the worker, namely the bad matches. This does not necessarily imply a change of the employer, but could also be an occupational change. Job or

occupational changes occur here because information was revealed and the wage would have been adjusted to the updated beliefs about true match quality, which is below the reservation wage for part of the individuals. After training, we observe a selection of bad matches out of the firm. The average match quality of the remaining matches is higher and therefore mobility reduces for the remaining workers. Then, the correlation between training and productivity, however, is not a causal effect, but a pure selection process.

From the point of view of the inspection good literature, the mobility effect of training is not clear. Typically in this literature, the wage setting mechanism is assumed to be wage setting by firms. Assuming that training is productivity enhancing, from profit maximization of the firms there is no clear prediction how individual wages should change.[4] But, in order for wages after training to be in equilibrium, firms should adopt the new wage offer distribution for the higher productivity and increase individual's wages. It is not clear however, how individual wages are adjusted, the only requirement being that the new wage distribution has been adjusted to productivity. So, there is no clear argument for an increase or a decrease of mobility after training arising from the inspection good literature.[5]

# 3    Wage Effects of Mobility

Discussing the wage effects of mobility after training in a theoretical context, the productivity-oriented human capital approach in connection with rent-sharing arguments predicts wage losses if training has provided the individual with specific skills. In the case of general training it is conceivable, for example under rent sharing, that individuals are paid below their outside option. In this case, we expect wage gains from a job change. For this to be true, it does not matter whether the mobility has been voluntary or involuntary.[6] Looking at the effect of job mobility on wages conditional on tenure and experience captures differences in the worker's history (that is a selection problem) and also nonlinearities in the effect of tenure on wages. Changing the view by concentrating on the effect of job mobility on wages after training has the advantage that the productivity effect of training is not captured by the black boxes experience or tenure, since we explicitly control for this increment in human capital. There are clear testable hypotheses from the point of view of human capital theory. If training provides individuals with (employer, occupation or task) specific skills and if returns are shared, a job (occupation, task) change after training is predicted to have a negative effect on wages, while there is no theoretical prediction for a job change without training. If a job change also invokes a negative coefficient, then the effect of job change after training is bigger. In the case of general skills and the presence of rent sharing between employer and employee, the predicted coefficient of job change after training is positive, because the part of the rent which is captured by the firm providing

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[4]More precisely, to each productivity there is an equilibrium wage distribution. However, the adjustment of the wages depend on the strategies available to the firm.

[5]Let us remind you however that there are selection arguments that predict low mobility and high training intensity for a part of the individuals and high mobility and low training intensity for other individuals (see Antel (1986)).

[6]This is the case, since from this point of view, individuals get their outside option if they change jobs, independently of whether job–to–job transitions are voluntary or involuntary.

training is not obtained by a new employer. Therefore, estimating the coefficient of job change after participating in training gives a hint whether training is mainly firm specific or general (see Loewenstein and Spletzer (2000)). However, a more complete analysis would also cover wage effects of mobility without training. Using occupational and major task changes instead of employer changes helps us detecting on which level training is specific. Is it specific to the employer, to the occupation, to a task or to one single job?

From the point of view of search theory, where jobs are seen as inspection goods, involuntary job mobility clearly has a negative expected effect on wages. This is due to the cross-sectional distribution of wages, which differs from the wage offer distribution in equilibrium search models because individuals select in higher paying jobs over time. Training in general skills is carried out in firms because search frictions compress wages from above (see Acemoglu (1997)). Firms can therefore capture part of the rent associated with the productivity increase. The wage effect of involuntary job mobility after training is also negative. To see why, assume that as argued above, after training, wages are adjusted to their new equilibrium values, the wage effect of changing a job involuntarily is uniquely negative for the same reason as without training. The individual loses the positive wage effect of labor market experience through voluntary job mobility (wage-ladder effect). Under the assumption that the individual takes the same relative position in the new wage distribution as in the old one, the absolute size of the wage loss from an exogenous job loss is bigger with training than without training, because a wage increment through a job change is larger, on average, if the productivity is high.[7]

In the experience good literature, several difficulties arise with job mobility and are to be discussed. First, voluntary mobility increases because individuals get to know that their match is a bad one. However, the wage effects of these cannot easily be assessed, since the mobility decision is not exogenous with respect to the wage. Second, it would be difficult to find the counterfactual wage for the individuals changing jobs. They resign because their wage would have been too low, a wage we do not observe in these models. The estimated wage effect of voluntary mobility based on a comparison between voluntary movers and stayers is negative. This is the case since the individuals that are still in the job (the control group) are a positive selection for this job and new jobs after voluntary mobility start at average wages. The measured wage effect of involuntary and exogenous mobility would be negative, since in this case the accumulated job–specific capital is lost. The workforce that was laid off because of the firm closure was a positive selection of all individuals because of voluntary mobility. In a new job this information is either lost or irrelevant. After training, the negative wage effect of exogenous job mobility is larger because the pool of workers has become better.

# 4   Results

Using the latest wave of the BIBB/IAB Qualification and Career Survey from 1998/1999, results indicate that those individuals which just changed jobs obtain training less often

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[7]In other words, the distance between the expectation of the wage offer distribution and the expectation of the distribution of paid wages increases with productivity.

than individuals which have not. This results contrasts former evidence for Germany (see e.g. Pannenberg (1997)). A second result is that individuals with several employers in their employment histories are more likely to take part in training. Training itself, though, seems to decrease mobility as individuals that have participated in training before 1997, change jobs less often after 1997 than otherwise comparable individuals. If we take into account that participation in training might be endogenous with respect to the mobility decision, the effect of training, instrumented by exogenous variation in the participation probability through collective agreements, increases in absolute value but turns insignificant. Comparing the wage effects of a job change after training as compared to all individuals that have participated in training and stayed with the employer afterwards, the effect seems not to be stable across different econometric methods. Least squares and propensity score matching results indicate negative effects of a job change after training on wages in the group of training participants. Since job mobility is endogenous and since we cannot control for all relevant characteristics, neither OLS nor matching methods yields credible results. Using bankruptcy as an instrument, some instrumental variables specifications yield positive and some yield negative coefficients, without being significant. This might be due to the small number of training participants which change their job after obtaining training in our sample. We are not able to conclude whether a job change after training results in higher or lower wages than a job change only, since the results are too mixed.

Then we consider the whole population and distinguish job changes after training and job changes, where there is no training before. Controlling for participation in training, OLS indicates a positive correlation of job changes with wages but a negative correlation with job changes after training and the usual positive correlation with training. Instrumenting job changes, job changes after training and training with bankruptcy, household size and the variation of participation because of collective agreements, increases all effects in magnitude but renders them insignificant. Using predicted probabilities from a probit estimation as instruments is more similar to the OLS results and yields slightly larger coefficients, which are significant for the case of job change and training but not significant for job change after training. Finally, we use information, where individuals judge themselves whether they profited from their last job change. A probit model with training before job changes as explanatory variable yields a negative but insignificant coefficient. Allowing for endogeneity and instrumenting again with the exogenous variation of training probability yields a huge positive effect that is significant. That is, if somebody is admitted exogenously to training, the probability that a job change leads to a perceived amelioration increases.

Also, for occupational changes our IV specifications seem not very reliable. With methods not controlling for endogeneity of job changes and/or training, we find that the partial correlation of occupational changes and wages is somewhat larger than the correlation of employer changes and wages. The same is true after training, which suggests that a bigger part of training is occupation instead of employer specific. For major changes of tasks we estimate smaller effects, which are again rarely significant.

# 5 Conclusion

All in all, the results suggest that changes of the employer or the occupation have a negative effect on the probability to obtain training, while the other way round, there is a negative correlation of training with job change. We do not find support for a causal effect from training on job changes. Similarly, there are no stable causal effects of exogenous job changes on wages, neither for job changes after training nor for job changes without training before. But again, the partial correlation structure is such that job changes after training come along with lower wages in the new job. Therefore, those individuals which changed jobs after training seem to be a negative selection of workers. This is in line with the experience good framework, where bad matches are detected during training and those workers leave the firm. Nevertheless, the overall image suggests that the biggest part of the skills imparted by training is general and that individuals profit from the investment no matter whether they change jobs after training or not.

For future work we plan to include differential effects of heterogenous training measures on heterogenous participants in our analysis.

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