Working Paper No. 46

Time - Even More Costly Than Money: Training Costs of Workers and Firms

Simone Tuor and Uschi Backes-Gellner

Universität Zürich
ISU – Institut für Strategie und Unternehmensökonomik

b
UNIVERSITÄT
BERN

Leading House Working Paper No. 46

Time - Even More Costly Than Money: Training Costs of Workers and Firms

Simone Tuor and Uschi Backes-Gellner

March 2009

The Swiss Leading House on Economics of Education, Firm Behavior and Training Policies is a Research Programme of the Swiss Federal Office for Professional Education and Technology (OPET).

www.economics-of-education.ch

Time - Even More Costly Than Money: Training Costs of Workers and Firms

Simone N. Tuor, Uschi Backes-Gellner
University of Zurich

March 2009

Abstract

We empirically investigate the joint training decisions of workers and firms. The aim of our study is to learn how various cost components affect workers' (non-)participation in training. In particular, we separately consider monetary and non-monetary training costs, which is possible thanks to an especially rich dataset that includes both participants and non-participants. Our estimation results show that workers whose firms cover some of their training costs would generally be more likely to have assumed the full training costs themselves had they not received employer support. Moreover, the share of self-financed training, as compared to employer-supported training, is generally low. Thus, firms moderate virtually all training decisions and, as a result, considerably influence (non-)participation patterns. Interestingly, although training non-participation can be attributed to both monetary and non-monetary costs, the latter seem to comprise the more binding restriction. That is, time is more costly than money.

Key words: Training costs, employer-supported training, time vs. money

JEL Classification: J24, M53

*This study is partially funded by the Swiss Federal Office for Professional Education and Technology through its Leading House on the Economics of Education, Firm Behaviour and Training Policies. We would like to thank the German Federal Institute for Vocational Education and Training and the German "Expert Commission on Financing Lifelong Learning" for providing data, Sandra E. Black and Edward P. Lazear for helpful comments, and Yvonne Herzog for providing excellent research assistance.

1. Introduction

Continuing vocational training is becoming increasingly important, largely because of technological change and demographic trends. Today, occupations involve greater complexity than they did some decades ago (Spitz-Oener 2006). These changing job requirements come along with a growing demand for (highly) skilled labor and, as a consequence, for further training. In addition to the skill-biased technological change, there is evidence of depreciation of knowledge and skills (Janssen/Backes-Gellner 2009), which particularly affects older workers, who, due to recent demographic trends, form a constantly rising proportion of the workforce. Hence, continuing vocational training seems indispensable to make up for such effects and ensure sustainable labor market success.

Considering these developments, it is little surprising that numerous empirical studies provide evidence for training to have positive impacts on individuals' labor market outcomes (for an international overview see Bassanini et al. 2005, for Germany see Büchel/Pannenberg 2003): training is found to be associated with significant wage increase, lower risk of unemployment or higher promotion probability. But all of these studies focus on returns.

However, a worker's decision to undertake training is not only determined by expected rewards, but also by expected costs. Therefore, analyses focusing on benefits might not be able to fully explain the observed (non-)participation training patterns. There are only a few studies that consider training costs in detail. This is mostly due to a lack of appropriate data. In this study, we are fortunate to be able to use a dataset that provides extensive cost information. Hence, we analyze training probabilities with a focus on the cost component in order to determine how different types of costs affect workers' participation.

There are two important points to be noted regarding workers' training costs. First, employers can be involved in training decisions by sharing training costs, which makes firms important players for the outcome of training decisions. Accordingly, to explain training patterns we have to distinguish between the case in which training costs are (partly) covered by the firm, referred to as *employer-supported training* and the case in which the worker bears training costs entirely on their own, referred to as *self-financed training*. Second, there are different types of costs (as there are various types of benefits), which can be categorized in two main components: aside from the most obvious *monetary costs* (i.e., training expenses), there are also *non-monetary costs* (i.e., time spent in training) attached to participation.

In this study, we analyze training participation patterns and aim to discover the extent to which these are due to the combined effect of workers and employers decisions and the role

of different training costs therein. In a first step, we study workers' probabilities of self-financing training conditional on receiving no employer support. In a second step, we examine the relation between the firms' and workers' training decisions.

As monetary and non-monetary costs can be expected to play different roles, all analyses are performed separately for these two cost components. In small firms, for instance, in which the production process is dependent on every single worker, participation during working hours might be excessively costly (as this would result in production loss). Nevertheless, support for a worker's training participation during leisure time might be possible. As another example, one could think of a worker with a long journey to work. Such a person might rather be willing to pay for training than to participate after working hours in the evening. Thus, we expect the distinction between the two groups of costs to be instructive for the understanding of training participation patterns.

To date, evidence regarding the joint training decisions of workers and firms (and thus training costs) has generally been scarce and is predominantly focused on employer-supported training (cf. e.g., Oosterbeek 1998 or Groot 1999). One notable exception is Bassanini et al., (2005) who simultaneously analyze the probability of employer-sponsored and non-sponsored training. The authors focus on differences in the impact of employment and individual characteristics on the respective training probabilities. However, they do not examine to what extent non-participation can be attributed to lack of employers' or workers' willingness to bear training costs, nor do they distinguish between the various cost components. Hence, when looking at employer-supported and self-financed training, we contribute to the existing literature by considering both monetary and non-monetary costs separately and by studying workers' willingness to completely bear training costs. This might help in understanding the issue of training (non-)participation.

The conceptual difficulty in analyzing these issues is that we observe whether a worker participates in training without knowing the reason why or why not. It is challenging to disentangle the effect of either side on the result, since we have no information on the individual decision of one of the parties if the other has decided differently – or even similarly. However, we are fortunate to be able to utilize a unique dataset of both participants and non-participants, which for the first time provides extensive cost information. It particularly provides separate and detailed information on monetary and non-monetary costs associated with training participation.

Based on this data, we are able to disentangle the firms' and the workers' impact on training decisions. Our findings show, first, that those workers who are considered for employer-

supported training would also be more likely to have self-financed their training had they not received this support. Second, looking at the two cost components separately, we find that for workers the willingness to bear monetary costs is much higher than it is to bear non-monetary costs, which emphasizes the importance of distinguishing between various cost components.

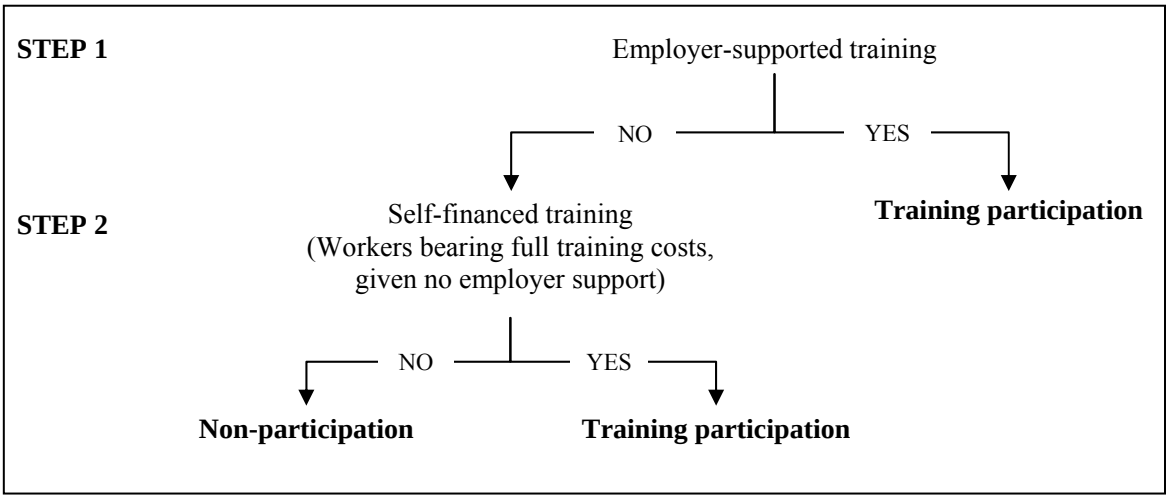
The structure of the paper is as follows: in section two we present some theoretical considerations concerning the training decisions of workers and firms. Subsequently, section three details the econometric model. In section four we describe the participants and non-participants survey and provide some descriptive statistics concerning the probability of employer-supported versus self-financed training participation. The results of the empirical investigation are presented in section five, and conclusions are drawn in the final section.

2. Theoretical framework of the training decisions of workers and firms

Following Bassanini et al. (2005: 71-72), we assume that training decisions are undertaken sequentially (cf. Figure 1): first, a firm decides whether to support a worker's training participation. We argue that employer-supported training is part of a worker's job and thus that there is no (subsequent) decision for the worker whether to accept training.[1] This is why employer-supported training directly results in a worker's training participation. If the employer does not provide training support, the worker chooses whether or not to bear the full training costs himself. Thus, we distinguish between two types of training: on the one hand, we consider workers whose training costs are (partly) covered by their firm. This case will be referred to as *employer-supported training*. On the other hand, we consider workers who lack employer support and must bear the entire training costs alone. This case will be referred to as *self-financed training*.

[1] Of course, some workers might also refuse to participate, even though they would receive employer support. However, we assume that such cases constitute an exception. First, in our dataset, some training participants report being forced to undertake training. Second, most non-participants report a lack of employer support as (one) cause of their non-participation (indicating the importance of employer-support).

Figure 1: Sequence of training decisions



To analyze the two subsequent training decisions of firms and workers, we use standard human capital theory (Becker 1975) as a framework. Each party can be supposed to invest in training if their expected benefits exceed their expected costs. The cost-benefit ratio and thus the willingness to bear training costs vary between workers and firms according to personal attributes, employment characteristics, and training content.

As concerns the latter (i.e., training content), the most prevalent distinction is between general and (firm-) specific human capital. We will show in the following two paragraphs that firms basically pay for training that imparts either type of knowledge:

In the standard analysis of human capital, it is argued that costs and returns to investments in *specific human capital* are shared by firms and workers because of uncertainty about post-investment behavior (Becker 1962) or because of the existence of transaction costs in evaluating and agreeing on a worker's productivity (Hashimoto 1981). Sharing investments therefore reduces the risk of separation and of losing a portion of an investment. It should be noted that sharing of human capital investments is expected to be widely observed, independent of the exact concept of specific human capital. Becker (1962), on the one hand, argues that much of the training has general as well as specific components but increases the worker's productivity more for the firm providing the training and is therefore referred to as specific training. In contrast, Lazear (2003) considers all training as general, but he assumes that each firm requires only a specific combination of skills.

When training is perfectly general, workers can capture the entire return to training (because *general human capital* would be just as useful in other firms) and, consequently, they also have to bear the full costs associated with training participation. This supposition, however, only holds as long as the labor market is assumed to be perfectly competitive. As soon as this

assumption is relaxed, employers can again be expected to share in training investments. If the worker's wage is below his productivity level, and the difference increases with skill level (due to a compressed wage structure), the employer has an incentive to invest in training because he can capture some of the return (see for example Acemoglu/Pischke 1999 or Booth/Zoega 2004). Thus, employers can generally be expected to pay for (firm-) specific as well as supposedly general human capital; therefore, we consider training of either content in our empirical analyses.

In the following paragraphs, we briefly specify which personal and employment attributes are expected to be associated with favorable cost-benefit ratios for firms, and we do the same for workers. Starting with individual characteristics, theoretical predictions concerning workers' and employers' training decisions are (mostly) identical. For instance, one usually assumes a complementarity between *education* and training, in which more educated workers are expected to have a greater willingness to undertake training, as well as a higher probability of being selected for employer-supported training.[2] The same applies to motivation and training because they are also assumed to exhibit a complementary relationship. As concerns *gender differences*, male workers can be expected to have a higher average training probability.[3] This again applies for employer-supported as well as for self-financed training. First, one would expect the probability of being selected for training by the employer to be higher for individuals who are regarded as being more committed to the firm. As Booth (1991: 285) points out, in preferring workers who seem more committed to the firm, employers discriminate against women. Secondly, the higher willingness of male workers to undertake training might arise from differences in preferences. These gender differences might even be more pronounced in the group of workers with *children* – i.e., having children might further reduce the average training probabilities of women.[4] Finally, following human capital theory, one would expect *younger* and *full-time workers* to have higher training probabilities than *older* and *part-time workers* because the expected pay-off period for the former two groups is

[2] Mincer (1962: 59) might have been the first to suggest the notion of complementarities between education and training, stating that school education has to be seen as a prerequisite for further training. Rosen (1976) specifies that more education enables individuals to exhibit greater job learning efficiency.

[3] It should be noted that in looking at participation patterns for women, as compared to those for men, one has to distinguish two sources of variability (Arulampalam et al. 2004: 355): on the one hand, the two groups might differ in respect of personal attributes and employment characteristics, while on the other hand there might also exist differences in the returns to training in the context of similar exhibited characteristics. This is why we perform separate analyses for men and women.

[4] From an employer's perspective, women with young children are usually expected to have a weaker attachment to the labor market than are men with young children. From an individual's perspective, having children might be associated with a substantial increase in the discount rate; on the other hand, and this might be especially true for male workers, having children might involve greater responsibilities and consequently a greater motivation to accumulate new human capital (Arulampalam/Booth 2001: 387), which could then counteract the aforementioned negative effect.

longer. Generally, this effect operates through both channels (i.e., through both workers' and firms' decisions). However, for the employer it is not so much mere age as the expectation of how long the worker will stay in the firm which is important. As older employees might find it more difficult to secure better job matches, they have a lower probability of leaving. Thus, it may as well be less risky for the employer to invest in these workers, which in turn might counteract the effect of a longer expected pay-off period for younger workers. So the overall effect is not clear ex ante.

To summarize, almost all individual characteristics are expected to have no systematically different impacts on the training decisions of firms and workers. As employment characteristics are generally expected to predominantly operate through the employers' decision to support training (because they influence companies' training costs and benefits) they do not affect (or at least do not counteract) this positive correlation between the two training decisions. Thus, we expect the two training decisions to be related as follows:

Those workers who receive employer-supported training are also the ones more likely to have borne the full training costs themselves had they not received employer support.

Of course, this hypothesis is difficult to test because we have no data regarding what would have occurred had the worker not received employer-supported training. Thus, we need an econometric method that will help us to disentangle the two effects and estimate the counterfactual (i.e., what would have happened if those workers who receive employer-supported training had not received such support).

Though a worker's true willingness to bear the full training costs might as well be hidden for the firm, the latter might have a guess about the worker's training decision in case of not being selected for employer-supported training. This question will be addressed in the empirical part. In the next section, we detail the exact estimation procedure applied to test the hypothesis.

3. Modeling the worker's and firm's decision to bear training costs

In the first step of the analysis, the goal is to sort out which factors determine the probability of receiving employer-supported training and which factors impact individuals' willingness to self-finance training participation. As it is likely that there exists a link between the firm's and the worker's training decisions, we use an empirical framework that explicitly takes account of this potential dependence. In a second step, based on these estimations, we calculate predicted training probabilities and assess whether those workers whose firm covers (part of)

the training costs would have borne the full costs themselves had they not received employer support. Finally, we examine the relation between the two training decisions.

3.1 Employer-supported training

The likelihood of a worker to take part in training primarily depends on the probability of receiving employer support. Firms are expected to select those workers who have the ability to benefit from training as well as those who are likely to remain with the firm after training. To estimate the impact of these characteristics on the probability of employer-supported training, we use the following probit model framework:

$$\begin{aligned} y_f^* &= \beta \cdot P_f + \gamma \cdot E_f + \varepsilon_f \\ y_f &= 1 \text{ if } y_f^* \geq 0 \\ y_f &= 0 \text{ if } y_f^* < 0 \end{aligned} \qquad (1)$$

The latent index y_f* models the underlying process of a firm's decision to support an employee's training participation by bearing (part of) the training costs. If a worker receives employer-supported training, y_f takes the value one, and zero otherwise. P_f and E_f represent vectors of personnel characteristics and employment characteristics, respectively; ε_f indicates the error term. Receiving employer support for training participation might be a strong predictor of actual participation. Nevertheless, we also observe workers who lack employer support and individually arrange and finance their participation (e.g., Greenhalgh/Malvrotas 1994). Hence, we additionally have to analyze the probability that a worker bears full training costs conditional on **no** employer support.

3.2 Workers bearing full training costs, given no employer support

Following Bassanini et al. (2005: 71-72), we assume that training decisions are undertaken sequentially (cf. section 2). The problems to be solved in the empirical analysis are, first, that the two decisions are expected to be related, and second, that all workers are obviously only observed in one situation (i.e., we do not know what would have happened if those workers who receive employer-supported training had not received such support). Thus, we have a censored dependent variable and a potentially selected sample of workers in the second step of the analysis.

The model to be used for such a framework is the censored bivariate probit model (Van de Ven/Van Praag 1981): the probability of receiving employer-supported training is observed

for the full sample of workers. But for the second step, the probability that a worker bears full training costs, there is a censored dependent variable and a potentially selected sample of workers. The model takes account of a potential correlation ρ of unobserved factors that have an impact on both equations, and we jointly estimate both equations with maximum likelihood. Although the bivariate probit with censoring does not require an exclusion restriction (i.e., a variable that has an impact on the selection equation but that does not affect the outcome equation), we include an additional variable that satisfies the exclusion restriction. Hence, the model structure can be written as follows:[5]

$$\begin{aligned} &y_f=1\text{: Prob } (y_f=1|x_w, x_f) \\ &y_w=0, y_f=0\text{: Prob } (y_w=0, y_f=0|x_w, x_f) \\ &y_w=1, y_f=0\text{: Prob } (y_w=1, y_f=0|x_w, x_f) \end{aligned} \qquad (2)$$

where y_w takes the value one if a worker self-finances his training participation and zero otherwise. This decision is expected to be determined by personal and employment characteristics reflected in x_w. Similarly, y_f indicates employer-supported training and, thus, x_f is a vector consisting of the aforementioned personnel (P_f) and employment (E_f) characteristics. According to this model, there are three observations to be distinguished and three probabilities to be estimated. Based on these estimations, we then calculate the predicted probability of self-financing participation for the full sample (cf. section 3.3).

We are not the first to use the bivariate probit model with censoring to analyze training decisions. Bassanini et al. (2005) also estimate a bivariate probit with censoring, in which employers decide on whether to pay for workers' training, and unsupported workers then choose whether or not to self-finance their training participation. Oosterbeek (1998) has also used this framework, but, instead of considering self-financed training, he focuses on employer-supported training and models the distinct decisions of firms and workers. Unlike in our framework, employer-supported training is conditional on a worker's willingness to participate. The fact that, in our dataset, some workers report being forced to participate in training, leads us to prefer the framework introduced by Bassanini et al. (2005).

A test of our hypothesis requires information about each workers' willingness to bear training costs (i.e., also for those who currently receive employer support). In the next section, we explain how these probabilities of workers to bear full training costs are estimated.

[5] The notation is based on Greene (2003: 713-714).

3.3 Predicted probabilities that workers would bear the full training costs

Before comparing the probabilities that workers will bear full training costs when not receiving employer-supported training, it is first necessary to address the problem that this probability can only be observed for those not currently receiving employer-supported training. Therefore, based on the estimation described above, we calculate a hypothetical conditional probability[6] for self-financing training. This can be accomplished for the full sample of workers and allows for testing the hypothesis that those workers who receive employer-supported training would also have been more likely to have borne the full training costs themselves had they not received employer support. Moreover, we are interested in learning whether the results depend on the cost measure, i.e., whether using monetary and non-monetary costs (in combination or separately) influences the estimation results. Thus, we first perform all analyses using one cost measure that includes both monetary and non-monetary costs, and then proceed to use two different cost measures, one for the monetary and one for the non-monetary cost component.

3.4 Relation of workers' and firms' training decisions

Finally, we are interested in finding out whether a worker's individual person-specific willingness to bear full training costs is incorporated in the firm's decision to support training. The reason is, that, as mentioned in the theoretical section, firms might have a guess about the worker's training decision in case of not being selected for employer-supported training. Therefore, we augment the probit model presented in section 3.1 (equation (1)) to incorporate the worker's willingness to bear the full training costs.

4. Data: survey of participants and non-participants

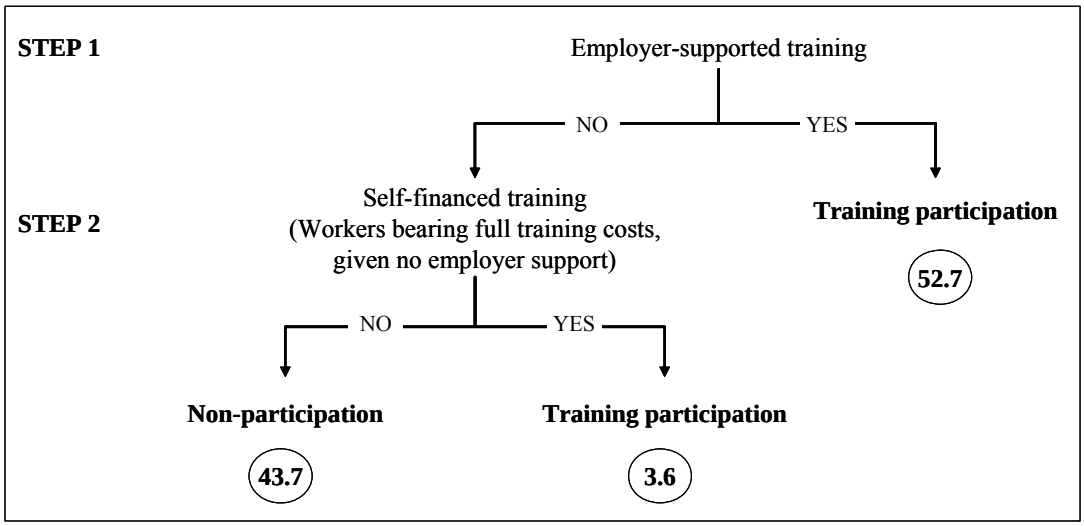
The availability of detailed cost information associated with workers' training participations is a necessary precondition for examining the questions raised in our study. We are fortunate in being able to use a dataset that provides such extensive cost information. Individuals from a large representative sample (of Germany) were contacted by telephone and asked whether they had taken part in continuing training in a given period. According to their answer, they were either allocated to the participants' surveys (further analyzed by Beicht et al. 2006) or to

[6] Pr(self-financed training=1|employer-supported training=0). It should be kept in mind that this probability is different from the "actual" unconditional probability Pr(self-financed training=1, employer-supported training=0).

the non-participants' surveys (further analyzed by Schröder et al. 2004).[7] For each sample, the telephone interviewers used a questionnaire specifically designed for the respective respondents. Moreover, there was a list of common questions that individuals in both groups were asked to answer, which allows the pulling together of the two datasets. In this paper, we use data from both the participant and non-participant surveys.

Most importantly, this rich dataset allows for the categorization of training participants into those who receive employer-supported training and those who bear the full costs of training. The two variables representing the firms' and workers' training decisions are defined as follows: the variable *employer-supported training* takes the value one if the employer bears (part of) the training costs (i.e., covers monetary training costs and/or offers training participation during working hours) and zero otherwise.[8] The variable *self-financed training* takes the value one if the worker bears full training costs and zero otherwise. We note that the term self-financed training refers to both monetary and non-monetary costs. Descriptive statistics for the three outcomes of the sequence of training decisions are given in Figure 2:

Figure 2: Training participation patterns



Note: the numbers in circles indicate percentages.

Considering full costs, 52.7% of the workers in the sample participated in employer-supported training, i.e., their firm covered monetary training costs, provided training during working hours, or partially/fully covered both types of training costs.[9] In contrast, 3.6% of the employees bore full training costs, i.e., training participation occurred completely during

[7] For information about the survey design, see Krekel/Walden (2007).

[8] There is a non-negligible proportion of workers reporting no costs. This seems unrealistic for job-related training and is therefore classified as employer-supported training (coincident with Booth/Bryan 2007).

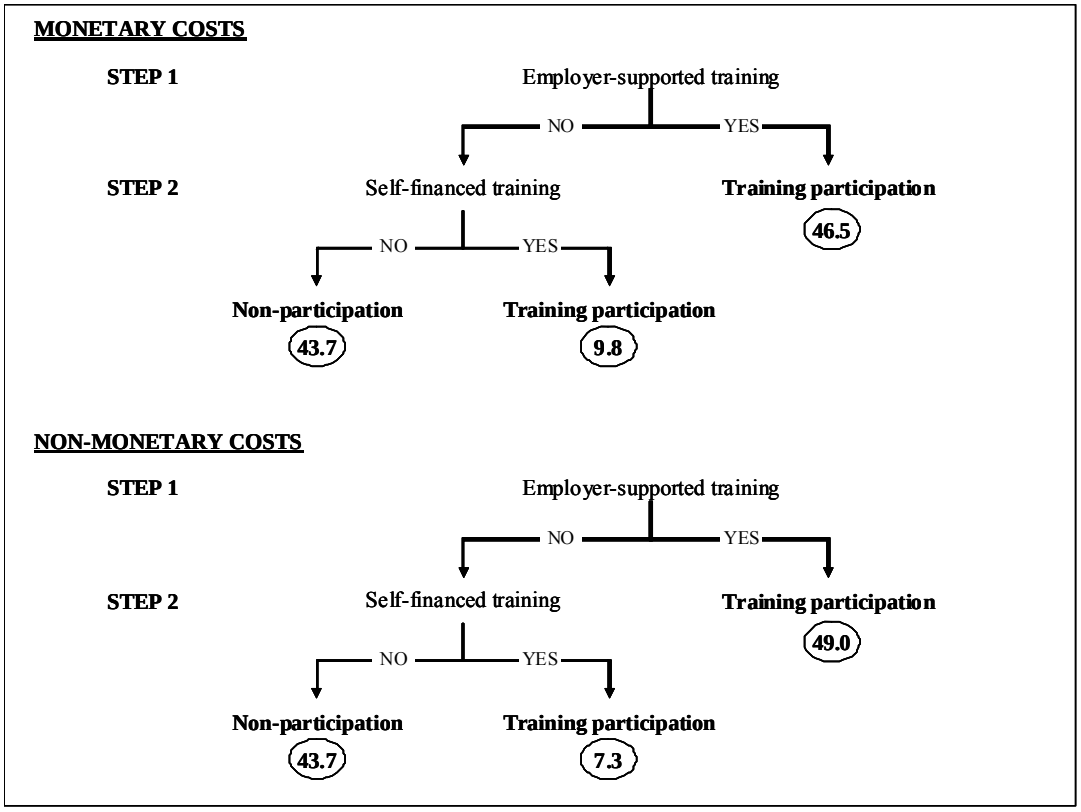
[9] Although individuals are not asked to report which part of the financial assistance is provided by the firm, the government, or the unemployment insurance system, the assumption of the firm being the main funding source should not be very strong because the sample analyzed conditions on employment.

leisure time and the workers bore all training expenses. The remaining workers (43.7%) are not participating in training.

As already mentioned, training investments involve both money (referred to as *monetary costs*) and time (referred to as *non-monetary costs*). This distinction is rarely – if at all – found in the training literature. For future research, however, it is important to know whether using monetary and non-monetary costs matters, either separately or in combination. Looking at monetary and non-monetary costs separately, the dependent variables are defined as follows: in relation to *monetary costs*, *employer-supported training* is defined as firms covering (part of) the pecuniary training costs and *self-financed training* participation involves workers bearing full training expenses; with regard to *non-monetary costs*, a worker receives *employer-supported training* if training participation occurs (at least partly) during working hours, and undertakes *self-financed training* if participation occurs exclusively during leisure time.

The distribution of participants in employer-supported and self-financed training, categorized in terms of monetary and non-monetary costs, is shown in Figure 3. It should be noted that, in looking at monetary costs separately, we do not consider how much employer support workers receive in terms of non-monetary costs (and vice-versa). In Figure 2, workers are categorized by whether they received employer-supported training independent of whether they obtained support in terms of both cost components. Figure 3 categorizes workers by the support they received in terms of particular cost components. Thus, if not all workers received employer support for both cost components, the numbers in employer-supported training should be lower and the numbers in self-financed training higher.

Figure 3: Training participation patterns for monetary and non-monetary costs



Note: the numbers in circles indicate percentages.

Considering the firms' decisions, there appears to be no significant difference between the two cost components; the probability that training occurs during working hours is slightly higher than the probability of receiving financial assistance, though both approach 50 percent. In contrast, the workers' average willingness to bear training costs varies by the type of cost: workers whose firms do not cover monetary costs are more likely to participate regardless and therefore to bear full training expenses than are those who lack employer support in terms of non-monetary costs. This confirms the assumption that time must be seen as a critical factor in workers' training decisions.

Comparing these numbers with the distribution obtained when using only one cost measure, this indicates that most training participants are supported in terms of both cost components. Figure 4 shows how monetary and non-monetary support are related. Not surprisingly, the vast majority of workers receive employer support in terms of either both cost components or neither. With regard to employees whose firm covers either exclusively monetary or exclusively non-monetary costs, the latter is much more frequent (6.2% versus 3.8%), but both situations are quite rare.

Figure 4: Percentage of workers receiving monetary and/or non-monetary employer support

Workers receiving….		Non-monetary support		Total
		YES	NO	
Monetary support	YES	**42.7 %**	**6.2 %**	48.9 %
	NO	**3.8 %**	**47.3 %**	51.1 %
Total		46.5 %	53.5 %	100 %

In summary, employer-supported training seems far more widespread than wholly self-financed training, and this conclusion is in line with existing evidence.[10]

As has been shown in section 2, the cost-benefit ratio and thus the willingness to bear training costs are determined by individual and employment characteristics. Hence, the explanatory variables used in our empirical analyses are those characteristics presented in the theoretical section. They correspond to the variables typically used in studies that deal with the determinants of training participation.[11] The choice of independent variables is especially comparable to Bassanini et al. (2005), which is the study most similar to our empirical analyses.

In those specifications which are used to test hypothesis two (which focuses on the relation between the firms' and workers' training decisions), we additionally include a variable representing a worker's willingness to bear monetary costs as well as a proxy for a worker's willingness to sacrifice leisure time for training participation. The latter variable is a dummy variable taking the value one if the worker states that at present he is short of time for training participation.

Concerning training content, which can also be assumed to influence cost-benefit ratios of training, we have shown that employer support is theoretically expected for general as well as specific human capital. Therefore, we do not restrict our analyses to one type of training content. Quite the contrary, the training definition which underlies our analyses includes an extensive range of training types[12], namely self-organized learning, training programs that take place at continuing vocational training institutes, schools or the companies themselves,

[10] According to Bassanini et al. (2005: 56-60), cross-country variation in employer-sponsored training courses is large. But even in countries with a relatively high share of non-sponsored training, such as in Switzerland, Ireland or Italy, the share of employer-sponsored training is at least 50%.

[11] There is no information about union membership in the dataset, so such a variable cannot be included. However Pischke (2001) argues that union coverage would be the relevant concept, which is almost universal in Germany anyway.

[12] See Table A1 in the Appendix.

participation at a congress or conference, and job-related types of training.[13] Thus, using such a broad training definition, we also identify participants in less formal and, in previous studies, less commonly included types of training.

For our empirical analyses, the sample is restricted to employed workers in the private sector. The reason for this focus is that our study analyzes the role that employers play in workers' training decisions. In the case of unemployed or non-employed persons, there is no employer at all. Self-employed persons are their own employer and civil servants are supposed to be in a different situation with regards to funding training costs, as they are paid by public authorities. Moreover, we only include workers aged 25-64, and we exclude any employees from the agriculture and forestry sectors. After additionally deleting all respondents who have missing information in one of the above variables, 1,365 observations remain. Variable definitions and certain descriptive statistics are in Table A2 in the Appendix.

5. Estimation results for the training decisions of workers and firms

To analyze the two subsequent training decisions, we first estimate the probability of employer-supported training. Second, we estimate the probability of self-financed training conditional on receiving no employer support. Based on these estimations, we then predict the willingness to bear training costs for the full sample of workers in order to test our hypothesis. Finally, we examine whether the worker's willingness to bear training costs is incorporated in the firm's training decision. We perform all analyses using one cost measure that includes both monetary and non-monetary costs and then proceed to use two different cost measures, one for the monetary and one for the non-monetary cost component.[14]

5.1 Analysis of employer-supported training

We start by looking at the probability of employer-supported training. The estimation results of the probit model are presented in Table A3, column 1, in the Appendix.[15] The findings are broadly consistent with the theoretical considerations presented in section 2: workers with a

[13] Of course there might be differences in the intensity of the involvement of firms dependent on the training content. Unfortunately, however, for those individuals who have taken part in more than one training type it is not possible to assign employer support to the various training participations. Therefore, we cannot distinguish between the various training types in our empirical analyses.

[14] It should be noted that all our analyses focus on training costs and do not explicitly model the benefits resulting from participation. The underlying assumption is that workers and firms who decide to invest in training do so with the expectation of positive returns.

[15] The probit estimates, presented in Table A3, have been transformed to show the marginal effects at the mean using the estimation procedure explained in Bartus (2005). We proceed in this way throughout the section.

secondary or tertiary educational degree, who are highly motivated for participation in training, who are full-time employed, or who are below 35 years of age all have higher training probabilities. The former two findings confirm the assumption that there is a complementarity between further training and formal education[16] as well as motivation; the latter finding is in line with human capital theory, which predicts the incentive to invest in training to be higher the longer is the expected pay-off period. Interestingly, none of the variables that reflect gender or family caring responsibilities seem to determine the likelihood of training. Thus, there is no evidence either for discrimination or for employers selecting workers on the basis of their perceived commitment to the firm.

Regarding employment characteristics, being a white-collar worker, facing changing knowledge and skill requirements and being employed in a large enterprise are all associated with substantially higher probabilities of receiving employer-supported training. This is consistent with the assumption that the production process and resulting skill requirements considerably impact a firm's training decision. Lastly, larger firms have a higher training probability, which might be due to economies of scale (i.e., fixed costs can be divided between more workers), lower production losses from absent workers (who are away from their jobs during the training period), or reduced risk of poaching externalities because of, for example, the existence of internal labor markets, which provide career opportunities (Lynch/Black 1998: 65-66).

Besides the individual and employment characteristics we include an additional variable indicating the training fraction by industry. In a next step (cf. section 5.2), in which we analyze the probability of self-financing training conditional on receiving no employer support, this variable is used as an exclusion restriction. The variable satisfies the exclusion restrictions and therefore qualifies for an instrumental variable because it correlates with the probability of receiving employer-supported training. [17]

Looking at monetary and non-monetary costs separately, the main patterns found in the analyses which has been performed by using a cost measure that includes all types of training are confirmed. The estimation results are shown in Table A4 and A5, column 1, in the Appendix. The most striking difference concerns the gender effect. Male workers are significantly more likely to receive employer support in terms of non-monetary costs than are female workers. This finding might be due to gender differences in negotiations. There is, for

[16] Of course, we cannot rule out the possibility that estimates of the effects of education also pick up ability. However, for the purposes of this study, this is not crucial. Therefore, we do not present an elaborate discussion of the existence of a potential heterogeneity bias.

[17] Moreover, it seems plausible to assume that after controlling for industry sector, the training fraction by industry should not have an impact on the probability of self-financing training participation.

instance, empirical evidence that women compared to men ask for less in pay negotiations (see for example Säve-Sörderbergh 2007). In the case of training this gender-specific behavior might result in a lower probability of being released from work to participate in training. Interestingly, regarding monetary costs, we do not find a difference between the two genders. We interpret this difference in terms of the two cost components as an indication that firms are rather willing to cover monetary costs than to provide training participation during working hours. To receive the latter, considerable negotiation skills might be essential.

Of course, separate estimations for male and female workers might be more appropriate for the analysis of training participation patterns. Therefore, we additionally provide the results of separate estimations by gender (cf. Table A3, column 2 and 3, in the Appendix). The main differences between male and female employees can be summarized as follows: for female employees, being aged below 35, having children, and being employed part-time is associated with a significantly lower probability of receiving employer-supported training. Firms might associate all these characteristics with a lower attachment to the firm. For male workers, however, this does not apply: none of these characteristics turns out to be significant. With the exception of the child effect, these results also hold when looking at monetary and non-monetary costs separately (cf. Table A4 and A5, column 2 and 3, in the Appendix). Interestingly, for women, having children "solely" affects the probability of (not) being supported in terms of non-monetary costs. This supports our assumption that distinguishing between the two cost components is important for analyzing training decisions, as firms seem to provide differing support in terms of monetary and non-monetary costs.

5.2 Analysis of workers bearing full training costs, given no employer support

Those workers who do not receive employer-supported training might consider bearing the full training costs themselves. To analyze the probability of self-financing training conditional on receiving no employer support, we estimate a bivariate model with censoring that takes into account unobserved factors influencing the firm's and worker's training decisions. The hypothesis that the correlation ρ between the selection equation and the outcome equation is zero cannot be rejected.[18] This implies that those factors that are not controlled in our estimations but that do affect training decisions are not the same (or at least are not correlated) across workers' and firms' decisions. This is not surprising, given that we suppose to have

[18] Bassanini et al. (2005) do find a selection effect for sponsored and non-sponsored training. Their definition of training and of sponsored vs. non-sponsored training is very different, however, meaning that the results are not directly comparable.

included most of the variables that can be assumed to exert influence on both decisions. Thus, we can use a simple probit model to estimate the outcome equation.[19] The results are shown in Table A3, column 4, in the Appendix.

Except from the finding that the education level does not (significantly) affect the probability of receiving employer-supported training, all variables show the expected influence: more motivated, childless and middle age workers are more likely to still participate in training even though they are not selected for employer-supported training.

As soon as we separately consider monetary and non-monetary costs, we find an education effect (cf. Table A4 and A5, column 4, in the Appendix). Better-educated workers have a higher willingness to pay for training as well as to sacrifice leisure time for training participation. This is in line with the theoretical predictions, which suppose a complementarity between education and training, resulting in a more favorable cost-benefit ratio for highly educated workers. The puzzle to be solved is why these workers, for whom training participation is individually beneficial, are not supported by their employer. One explanation is to be found in the differing expectations concerning the continuation of the work relation. For instance, firms might expect highly educated workers to have attractive outside options, for which reason the risk of losing an investment in training is high. This assumption is supported by the fact that workers with tertiary education are overrepresented in the group of employees who self-finance their training participation.

Although none of the estimations indicates a gender effect, we briefly sketch the most interesting result when performing separate estimations. In contrast to the estimations of employer-supported training, we find that for women having children reduces the willingness to pay for training but does not influence the willingness to bear non-monetary costs. For male workers, we again do not find a difference.

5.3 Analysis of predicted probabilities that workers would bear the full training costs

Given that the share of self-financed training is much smaller than that of employer-supported training, it is even more important to know who is able and willing to bear full training costs. Thus, as a next step, we predict the probability of self-financing training for the full sample of workers, conditional on receiving no employer-supported training (cf. Table 1).

[19] As the hypothesis that the correlation between the two equations is zero cannot be rejected for either estimation performed, we proceed in this way throughout the section.

Table 1: Predicted training probabilities conditional on receiving no employer support, including all types of costs

	Workers who currently receive employer-supported training			Workers who do **not** receive employer-supported training			Mean comparison test		
	Full Sample	Male Workers	Female Workers	Full Sample	Male Workers	Female Workers	Full Sample	Male Workers	Female Workers
Monetary and non-monetary costs	0.1516 (0.0058)	0.1715 (0.0084)	0.1197 (0.0094)	0.0759 (0.0043)	0.0911 (0.0070)	0.0355 (0.0042)	***	***	***

This predicted probability is, on average, 7.59% for those presently not receiving employer-supported training, and 15.16% for those whose training costs are currently shared or completely covered by the firm. A mean comparison test shows that the difference between these average predicted probabilities is highly significant. Thus, the results are consistent with our hypothesis: those who currently receive employer support would also have a higher probability of still participating in training had they not received this support. The fact that firms support some workers who would also be willing to bear the full training costs seems counterintuitive, at least at first sight, and should be investigated in more detail. One explanation could be that firms pursue various associated side benefits by providing training, such as increasing employees' commitment to the firm or signaling good career opportunities to outside workers. We will discuss various explanations in the next section.

Performing separate estimations by gender demonstrates that female workers are systematically less likely to bear the full training costs. These large differences, however, have to be interpreted with some caution, as the estimation for female workers can only be performed for a reduced sample (cf. Table A3, column 6, in the Appendix).

Again, predicted probabilities of self-financing training conditional on receiving no employer support are additionally calculated separately for monetary and non-monetary costs. This reveals interesting new insights.

Table 2: Predicted training probabilities conditional on receiving no employer support in respect of the considered cost component

	Workers who currently receive employer support in the considered cost component			Workers who do **not** receive employer support in the considered cost component			Mean comparison test		
	Full Sample	Male Workers	Female Workers	Full Sample	Male Workers	Female Workers	Full Sample	Male Workers	Female Workers
Monetary costs	0.2945 (0.0083)	0.3153 (0.0107)	0.2919 (0.0163)	0.1830 (0.0067)	0.2076 (0.0094)	0.1571 (0.0112)	***	***	***
Non-monetary costs	0.2392 (0.0061)	0.2321 (0.0087)	0.2593 (0.0112)	0.1433 (0.0046)	0.1441 (0.0074)	0.1438 (0.0072)	***	***	***

With regard to monetary costs, the results demonstrate that those workers whose firm currently pays (part of) the training expenses would also have a significantly higher willingness to bear the full monetary costs had they not received any employer support. This predicted probability exceeds by more than half the probability for the group of workers who currently do not receive financial assistance. This difference is highly significant. Not surprisingly, the numbers for both groups are higher than those for the analysis using a cost measure including all types of costs (cf. Table 1). Some workers who do not receive financial assistance might still be supported in terms of non-monetary costs. This, however, is not the norm, as has been shown in the previous section.

Turning to the results for non-monetary costs, one notices that the predicted training probabilities conditional on receiving no employer support in terms of non-monetary costs are considerably lower than those found for monetary costs. Receiving the opportunity to undertake training during working hours is a better predictor of actual participation than receiving financial support. This indicates the importance of training opportunities during working hours. Comparing workers who receive training during working hours with those who do not, the main patterns found with respect to monetary costs remain evident. Hence, the hypothesis test is also confirmed for monetary and non-monetary costs. However, the predicted probabilities vary systematically according to the cost component examined. These differences are even more pronounced when considering male and female workers separately. Men have on average a higher willingness to bear monetary costs than do women. The difference is even higher in the group of workers who presently do not receive employer support. In contrast, women would be at least as likely as men to fully participate during leisure time.

In summary, workers' average willingness to bear the full training costs is rather low. This applies to both groups of workers analyzed but is even more pronounced in the group of those employees who are presently not considered for employer-supported training. Obviously, firms moderate practically all training decisions and thus considerably influence training (non-)participation patterns. Concerning different cost components, our findings demonstrate that there are systematic differences in the respective willingness to bear the full training costs. Workers are a lot more likely to pay for training than they are to sacrifice leisure time. Thus, non-monetary costs seem to form the more binding restriction.

Up to this point, we have not analyzed whether firms consider workers' willingness to bear training costs. This is the focus of the next section and might help to explain the observed training participation patterns.

5.4 Analyses of the relation of workers' and firms' training decisions

In the previous section, we have shown that those workers who receive employer-supported training would also be the ones more likely to have borne the full training costs themselves had they not received employer support. The question to be answered is why firms support some workers who would also be willing to bear the full training costs themselves. There are several explanations for this phenomenon, which will be discussed in the following.

Basically, there are two explanatory approaches, which differ in their underlying assumption on whether firms (can) consider workers' willingness to bear training costs in their training decisions. Theoretically, we expect that a firm invests in training if benefits exceed costs. Thus, we would assume that a worker's willingness to bear training costs is not incorporated in the firm's training decision. The empirical findings could also be explained by the existence of information asymmetry. In this case, firms cannot identify those workers who would also be willing to self-finance their training participation, or identification would be very costly. Both explanations predict that firms' decisions are made independently of the workers' willingness to bear the full training costs.

Alternatively, one could argue that the patterns observed are a result of firms' human resource strategies. Training either constitutes a component of a worker's compensation package or is used as a means of improving an employee's commitment to the firm. Of course firms do not know a worker's exact willingness to bear training costs, but they might have a guess about it. Thus, we expect that a worker's willingness to bear training costs is positively associated with his probability of receiving employer support because the former indicates a worker's interest in – as well as his benefit from – training.

In order to investigate which explanation approach is supported by the empirical evidence, we incorporate two variables representing a worker's willingness to bear training costs into the estimation model used to analyze a firm's training decision. On the one hand, we include a variable indicating whether a worker is willing to pay for training. On the other hand, we use a worker's statement of whether he lacks time to participate in training as a proxy for his willingness to sacrifice leisure time for training. The results are presented in Table 3 (for the detailed estimation results see Table A6 in the Appendix).

Table 3: Relation of training decisions

	Employer-supported training		
	Monetary and non-monetary costs	Monetary costs	Non-monetary costs
Willingness to pay	0.2267*** (0.0458)	0.1700*** (0.0432)	
Lack of time	-0.1447*** (0.0298)		-0.1399*** (0.0296)
Individual characteristics	YES	YES	YES
Employment characteristics	YES	YES	YES
Prob > χ^2	0.0000	0.0000	0.0000
N	1365	1365	1365

Notes: Marginal effects at the mean; std.errors are in parentheses; *statistically significant at the 0.10 level, **at the 0.05 level, ***at the 0.01 level.

In favor of the latter approach (i.e., the commitment explanation), the variable representing a worker's willingness to pay for training turns out to have a significant positive impact on the probability of receiving employer-supported training.[20] Moreover, workers who state that they lack time for training participation are not more but actually less likely to be selected for employer-supported training. These patterns also hold when looking at monetary and non-monetary costs separately and when performing separate estimations by gender.[21] Thus, the probability of receiving employer-supported training is not independent of but rather positively associated with a worker's willingness to bear training costs.

Although the main aim of training has to be seen in increasing workers' productivity, firms seem to pursue a strategy of increasing workers' commitment to the firm by also providing employer support in training participation. Thus, they consciously accept that some of these workers would also be willing to self-finance their training. Of course, we would need more detailed information about a firm's human resource strategy in order to conclusively confirm this explanation. However, we interpret our estimation results as evidence in favor of such a relation.

Alternatively, the findings could indicate that sharing of training costs is widespread and requires that workers are willing to partly pay for training and also to participate during leisure time. However, as for two thirds of those workers who are selected for employer-supported training firms cover the full monetary and non-monetary training costs, this explanation is unlikely.

[20] The main results presented in section 5.1 still hold after introducing the two additional variables. This indicates that although other individual characteristics might be correlated with the willingness to bear training costs, this does not have an impact on their determination of the probability of employer-supported training.

[21] The results from separate estimations for male and female workers can be obtained from the authors upon request.

Of course, training content as well as the aim of training might systematically vary between the two groups (i.e., those workers who receive employer-supported training and those who bear the full training costs themselves).[22] We would expect firms to predominantly support training that increases a worker's productivity within the firm, while workers who self-finance their training might generally aim at improving their labor market prospects. This, however, is not within the scope of our study but could be an interesting question for further research.

Finally, training might not only be useful for increasing employees' commitment to the firm but also for attracting new workers and thus for improving recruitment success (Backes-Gellner/Tuor 2010, forthcoming). This explanation neither supports nor contradicts the finding presented in Table 3 and unfortunately cannot be tested with the current dataset, which does not provide the necessary information about a firm's vacancy rate or recruitment success.

6. Conclusions

We empirically examined training decisions of workers and firms, with a focus on training costs. Our analysis distinguished monetary from non-monetary costs in order to learn how various cost components affect workers' (non-)participation in training. The results show that employer support in terms of both monetary and non-monetary costs is crucial for training participation. The latter have rarely been considered in the literature to date but seem to form the main binding restrictions.

The use of an exceptionally rich dataset allowed us to identify the employer's selection process separate from the worker's willingness to bear full training costs and also allowed us to compare the importance of monetary and non-monetary costs. This yields new insights into non-participation patterns in particular. Interestingly, the findings show that the (predicted) probability of self-financing training participation is generally low but that it is higher for those presently receiving employer-supported training. Aside from this, the prevalence of employer-supported training found in previous studies is confirmed. Obviously, firms moderate virtually all training decisions. Accordingly, policies aiming at increasing training participation should consider firms' incentives for providing training.

Looking at monetary and non-monetary cost components separately, the main patterns remain evident: non-participation can be attributed to a lower willingness (or ability) of these workers

[22] For instance, Pischke (2001) provides some evidence that training during leisure time is associated with more pronounced wage growth than is training during working hours (though the effect is not significant).

to bear full training costs, as well as to a lack of employer support in terms of both monetary and non-monetary costs. However, non-monetary costs have rarely been considered (separately) in the literature but seem to form the binding restriction. The question to be answered, then, is why firms do not provide more support in terms of non-monetary costs. One explanation for firms providing financial assistance over training during working hours is that the latter might result in overtime, which is more costly for the company than is covering training expenses. Another probable explanation is that in small firms, for instance, in which the production process is dependent on every single worker, participation during working hours might simply be impossible (as this would result in production loss). Nevertheless, support for a worker's training participation during leisure time might be possible.

Alternatively, one could argue that firms just do not know about the existence of time restrictions. This, however, does not seem to be the case. Quite the contrary: workers' willingness to bear training costs is positively associated with receiving employer support in training participation. We assume that firms thereby pursue a strategy of increasing workers' commitment to the firm. Thus, the observed relation is rather the result of conscious decisions made by firms than the result of allocation problems concerning training support within firms.

Of course, the final responsibility of participating in training rests on the individual worker. Nevertheless, a society should aim at having an educational and further training system that ensures a productive populace. It would therefore be interesting to combine an analysis of different benefits with an examination of the various cost components and thereby evaluate firms' incentives to provide training. This may be an issue for future research, assuming the existence of an appropriate dataset. Until then, one should keep in mind that, for both the worker and the firm, time seems to be more costly than money.

References

Acemoglu, D., & Pischke, J.-S. (1999). Beyond Becker: Training in Imperfect Labour Markets. *The Economic Journal, 109*, 112-142.

Arulampalam, W., & Booth, A. L. (2001). Learning and Earning: Do Multiple Training Events Pay? A Decade of Evidence from a Cohort of Young British Men. *Economica, 68*, 379-400.

Arulampalam, W., Bryan, M. L., & Booth, A. L. (2004). Training in Europe. *Journal of the European Economic Association, 2*(2-3), 346-360.

Backes-Gellner, U., & Tuor, S. N. (2010, forthcoming). Avoiding Labor Shortages by Employer Signaling - On the Importance of Good Work Climate and Labor Relations. *Industrial and Labor Relations Review.*

Bartus, T. (2005). Estimation of Marginal Effects Using Margeff. *The Stata Journal, 5*(3), 309-329.

Bassanini, A., Booth, A. L., Brunello, G., De Paola, M., & Leuven, E. (2005). Workplace Training in Europe. *IZA Discussion Papers, 1640*.

Becker, G. S. (1962). Investment in Human Capital: A Theoretical Analysis. *Journal of Political Economy, 70*(5), 9-49.

Becker, G. S. (1975). *Human Capital. A Theoretical and Empirical Analysis with Special Reference to Education*. New York/London: Columbia University Press.

Beicht, U., Krekel, E. M., & Walden, G. (2006). *Berufliche Weiterbildung - Welche Kosten und welchen Nutzen haben die Teilnehmenden?* Bielefeld: Bertelsmann.

Booth, A. L. (1991). Job-Related Formal Training: Who Receives It and What Is It Worth? *Oxford Bulletin of Economics & Statistics, 53*(3), 281-294.

Booth, A. L., & Bryan, M. L. (2007). Who Pays for General Training in Private Sector Britain? *Research in Labor Economics, 26*, 85-123.

Booth, A. L., & Zoega, G. (2004). Is Wage Compression a Necessary Condition for Firm-Financed General Training? *Oxford Economic Papers, 56*, 88-97.

Büchel, F., & Pannenberg, M. (2004). Berufliche Weiterbildung in West- und Ostdeutschland – Teilnehmer, Struktur und individueller Ertrag. *Zeitschrift für Arbeitsmarktforschung (ZAF), 37(2)*, 73-126.

Greene, W. H. (2003). *Econometric Analysis*. Upper Saddle River, NJ: Prentice Hall.

Greenhalgh, C., & Mavrotas, G. (1994). The Role of Career Aspirations and Financial Constraints in Individual Access to Vocational Training. *Oxford Economic Papers, 46*(4), 579-604.

Groot, W. (1999). Productivity Effects of Enterprise-Related Training. *Applied Economics Letters, 6*, 369-371.

Hashimoto, M. (1981). Firm-Specific Human Capital as a Shared Investment. *American Economic Review, 71*(3), 475-484.

Janssen, S., & Backes-Gellner, U. (2009). Skill Obsolescence, Vintage Effects and Changing Tasks. *Applied Economics Quarterly, 55*(1), 83-104.

Krekel, E. M., & Walden, G. (2007). What Influence Do Work-Life Situations and Vocational Orientation Measures Exert on Individual Commitment to Continuing Training? *Zeitschrift für Arbeitsmarktforschung (ZAF), 40*(2/3), 271-293.

Lazear, E. P. (2003). Firm-Specific Human Capital: A Skill-Weights Approach. *IZA Discussion Papers, 813*.

Lynch, L. M., & Black, S. E. (1998). Beyond the Incidence of Employer-Provided Training. *Industrial & Labor Relations Review, 52*(1), 64-81.

Mincer, J. (1962). On-the-Job Training: Costs, Returns and Some Implications. *Journal of Political Economy, 70*(5), 50-79.

Oosterbeek, H. (1998). Unravelling Supply and Demand Factors in Work-Related Training. *Oxford Economic Papers, 50*, 266-283.

Pischke, J.-S. (2001). Continuous Training in Germany. *Journal of Population Economics, 14*, 523-548.

Rosen, S. (1976). A Theory of Life Earnings. *Journal of Political Economy, 84*(4, Part 2), S45-S67.

Säve-Sörderbergh, J. (2007). Are Women Asking for Low Wages? Gender Differences in Wage Bargaining Strategies and Ensuing Bargaining Success. *Swedish Institute for Social Research Working Paper Series, 7/2007*.

Schröder, H., Schiel, S., & Aust, F. (2004). *Nichtteilnahme an beruflicher Weiterbildung, Motive, Beweggründe, Hindernisse. Schriftenreihe der Expertenkommission Finanzierung Lebenslangen Lernens* (Vol. 5). Bielefeld: Bertelsmann.

Spitz-Oener, A. (2006). Technical Change, Job Tasks, and Rising Educational Demands: Looking outdside the Wage Structure. *Journal of Labor Economics, 24*(2), 235-270.

Van de Ven, W. P. M. M., & Van Praag, B. M. S. (1981). The Demand for Deductibles in Private Health Insurance: A Probit Model with Sample Selection. *Journal of Econometrics, 17*(2), 229-252.

Appendix

Table A1: Types of training included

NAME OF CATEGORY	TYPES OF TRAINING REPORTED IN THE SURVEY
Self-organized cvt	Self-organized continuing vocational training: distance learning course computer based learning self-organized learning using TV, radio or video self-organized learning using textbooks, teaching material or technical literature
Training program (cvt inst./school)	Seminar, course, training at a continuing vocational training institute at a technical school continuing vocational training in the scientific domain
Congress, conference	Technical lecture, congress, conference, trade fair
Training program (company)	Seminar, course, training at the (own) company, at a manufacturer, at a supplier
Job-integrated learning	Types of further qualifications that are closely related to job organized initial skill adaptation training or instruction at the workplace, trainee-program operational activities to increase occupational qualification operational exchange activities (e.g. with another company) activities of occupational orientation

Table A2: Definitions and descriptives of variables

Variable	Definition	Mean (Std.dev.)			
		Full Sample		Participants	
		Non-participants	Participants	Employer-supported	Self-financed
DEPENDENT VARIABLE					
Employer-supported training	1 if firm covers (part of) worker's training costs, 0 otherwise	0.5267 (0.4995)			
Self-financed training	1 if worker bears full training costs (cond. on receiving **no** employer-supported training), 0 otherwise	0.0759 (0.2650)			
INDEPENDENT VARIABLE					
Individual Characteristics					
No educational degree	Reference	0.0553 (0.2287)	0.0234 (0.1514)	0.0195 (0.1383)	0.0816 (0.2766)
Secondary education		0.8208 (0.3839)	0.5872 (0.4927)	0.6022 (0.4898)	0.3673 (0.4871)
Tertiary education		0.1240 (0.3298)	0.3893 (0.4879)	0.3783 (0.4853)	0.5510 (0.5025)
Male	1 if a person is male, 0 otherwise	0.5176 (0.5001)	0.5885 (0.4924)	0.5855 (0.4930)	0.6327 (0.7871)
Child	1 if a person has at least one child, 0 otherwise	0.4489 (0.4978)	0.4453 (0.4973)	0.4506 (0.4979)	0.3673 (0.4871)
Age25_34	Reference	0.2563 (0.4369)	0.2526 (0.4348)	0.2448 (0.4303)	0.3673 (0.4871)
Age35_44		0.3652 (0.4819)	0.4115 (0.4924)	0.4103 (0.4922)	0.4286 (0.5000)
Age45_54		0.2781 (0.4484)	0.2630 (0.4406)	0.2726 (0.4456)	0.1224 (0.3312)
Age55_64		0.1005 (0.3010)	0.0729 (0.2602)	0.0723 (0.2592)	0.0816 (0.2766)
Part-time employment	1 if a person is employed part-time, 0 if a person is employed full-time	0.2563 (0.4369)	0.1641 (0.3706)	0.1599 (0.3668)	0.2245 (0.4216)
Motivation	1 if training and learning is fun	0.7990 (0.4011)	0.9440 (0.2301)	0.9458 (0.2267)	0.9184 (0.2766)
Willingness to pay	1 if willingness to pay in Euro >0, 0 otherwise	0.7822 (0.4131)	0.9466 (0.2249)	0.9430 (0.2920)	
Lack of time	1 if there is lack of time for training participation, 0 otherwise	0.5477 (0.4981)	0.3646 (0.4816)	0.3602 (0.4804)	
Employment Characteristics					
White-collar worker	1 if a person is a white-collar worker, 0 if a person is a blue-collar worker	0.6030 (0.4897)	0.8555 (0.3519)	0.8554 (0.3520)	0.8571 (0.3536)
Change	1 if knowledge and skill needs change, 0 otherwise	0.4874 (0.5003)	0.7122 (0.4530)	0.7177 (0.4504)	0.6327 (0.4871)
Experience (divided by 10)	Labor market experience (in 10 years)	2.3774 (1.0136)	2.1085 (1.0119)	2.1314 (1.0054)	1.7714 (1.0559)
Micro enterprise	<10 employees, Reference	0.1910 (0.3934)	0.0977 (0.2970)	0.0904 (0.2870)	0.2041 (0.4072)
Small&medium-sized enterprise	10-249 employees	0.4204 (0.4940)	0.3372 (0.4731)	0.3338 (0.4719)	0.3878 (0.4923)
Large enterprise	>249 employees	0.3886 (0.4878)	0.5651 (0.4961)	0.5758 (0.4946)	0.4082 (0.4966)
Primary sector of industry	Reference	0.1457 (0.3531)	0.0755 (0.2644)	0.0751 (0.2637)	0.0816 (0.2766)
Secondary sector of industry		0.3082 (0.4621)	0.2734 (0.4460)	0.2726 (0.4456)	0.2857 (0.4564)
Tertiary sector of industry		0.5461 (0.4983)	0.6510 (0.4770)	0.6523 (0.4766)	0.6327 (0.4871)
Instrumental variable					
Fraction of training by industry	Fraction of employer-supported training by industry code	0.4794 (0.1138)	0.5370 (0.1159)	0.5387 (0.1167)	

Note: The firm size categories are according to the EU-definition.

Table A3: Employer-supported and self-financed training: including all types of costs

	Employer-supported training			Self-financed training		
	Full Sample	Male Workers	Female Workers	Full Sample	Male Workers	Female Workers°
Individual characteristics						
No educational degree	Reference	Reference	Reference	Reference	Reference	Reference
Secondary education	0.1839**	0.2740**	0.1228	-0.0453	-0.1002	0.025
	(0.0758)	(0.1099)	(0.1073)	(0.0403)	(0.0635)	(0.0456)
Tertiary education	0.3030***	0.3445***	0.3110***	0.104	0.0396	0.2059
	(0.0811)	(0.1155)	(0.1175)	(0.0852)	(0.0948)	(0.2824)
Male	0.0528			0.0206		
	(0.0361)			(0.0168)		
Child	-0.0094	0.0461	-0.1040*	-0.0283*	-0.0204	-0.0433
	(0.0328)	(0.0416)	(0.0547)	(0.0163)	(0.0194)	(0.0379)
Age25_34	-0.2343**	-0.0955	-0.3666***	-0.0852*	-0.0658	-0.5967***
	(0.1038)	(0.1472)	(0.1387)	(0.0478)	(0.0809)	(0.1320)
Age35_44	-0.0811	0.01	-0.1327	-0.0537	-0.0399	-0.5328***
	(0.0946)	(0.1278)	(0.1380)	(0.0656)	(0.1065)	(0.2048)
Age45_54	0.0024	0.0826	-0.085	-0.0644*	-0.0393	-0.4951***
	(0.0716)	(0.0960)	(0.1082)	(0.0371)	(0.0701)	(0.1245)
Age55_64	Reference	Reference	Reference	Reference	Reference	Reference
Part-time employment	-0.1392***	-0.1484	-0.1214**	0.0088	0.0297	-0.0093
	(0.0422)	(0.1159)	(0.0505)	(0.0226)	(0.0529)	(0.0369)
Motivation	0.2467***	0.2543***	0.2521***	0.0249*	0.0043	
	(0.0437)	(0.0581)	(0.0648)	(0.0151)	(0.0242)	
Employment characteristics						
White-collar worker	0.2325***	0.2768***	0.2217***	0.0358**	0.0324	
	(0.0371)	(0.0453)	(0.0658)	(0.0155)	(0.0236)	
Change	0.1501***	0.1447***	0.1648***	0.0209	0.0416*	0.0013
	(0.0300)	(0.0409)	(0.0448)	(0.0157)	(0.0235)	(0.0280)
Experience (divided by 10)	-0.0591	-0.125	0.016	-0.0458	-0.0192	-0.1063**
	(0.0776)	(0.0976)	(0.1281)	(0.0319)	(0.0475)	(0.0537)
Experience squared	-0.0011	0.001	-0.0032	0.0002	-0.0006	0.0003
	(0.0017)	(0.0021)	(0.0027)	(0.0007)	(0.0012)	(0.0012)
Micro enterprise	Reference	Reference	Reference	Reference	Reference	Reference
Small and medium-sized enterprise	0.0914**	0.065	0.1093*	-0.0305	-0.1155**	0.038
	(0.0454)	(0.0687)	(0.0621)	(0.0246)	(0.0450)	(0.0379)
Large enterprise	0.1874***	0.1365*	0.2408***	-0.0394*	-0.1228***	0.02
	(0.0456)	(0.0697)	(0.0618)	(0.0226)	(0.0434)	(0.0376)
Primary sector of industry	0.0855	0.0255	0.2153*	-0.0202	-0.0534**	0.0577
	(0.0549)	(0.0641)	(0.1143)	(0.0215)	(0.0231)	(0.1129)
Secondary sector of industry	Reference	Reference	Reference	Reference	Reference	Reference
Tertiary sector of industry	0.0074	-0.0648	0.1469**	-0.0077	-0.0349	0.0407
	(0.0365)	(0.0459)	(0.0605)	(0.0198)	(0.0266)	(0.0265)
Fraction of training by industry	0.7191***	0.6562***	0.7511***			
	(0.1509)	(0.2167)	(0.2119)			
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	1365	761	604	646	340	203

Notes: Marginal effects at the mean; std.errors are in parentheses; *statistically significant at the 0.10 level, **at the 0.05 level, ***at the 0.01 level; ° Low motivation as well as being a blue-collar worker predicts failure perfectly for which reason those workers are not included in the respective estimation.

Table A4: Employer-supported and self-financed training: monetary costs

	Employer-supported training			Self-financed training		
	Full Sample	Male Workers	Female Workers	Full Sample	Male Workers	Female Workers
Individual characteristics						
No educational degree	Reference	Reference	Reference	Reference	Reference	Reference
Secondary education	0.1353*	0.1716	0.1262	-0.0068	-0.0146	0.0005
	(0.0744)	(0.1089)	(0.1052)	(0.0571)	(0.0791)	(0.0658)
Tertiary education	0.2029**	0.2299**	0.1933	0.2301**	0.1705	0.2886
	(0.0828)	(0.1161)	(0.1249)	(0.1060)	(0.1238)	(0.1952)
Male	0.0302			0.0414		
	(0.0350)			(0.0304)		
Child	0.0045	0.0361	-0.0466	-0.0543*	-0.0172	-0.0717**
	(0.0320)	(0.0412)	(0.0526)	(0.0295)	(0.0405)	(0.0346)
Age25_34	-0.2879***	-0.1173	-0.4355***	-0.0299	0.0608	-0.2196***
	(0.1003)	(0.1445)	(0.1314)	(0.0701)	(0.1142)	(0.0671)
Age35_44	-0.1798*	-0.0541	-0.2626*	0.0633	0.1482	-0.1176
	(0.0946)	(0.1291)	(0.1370)	(0.0926)	(0.1382)	(0.1377)
Age45_54	-0.0985	-0.0022	-0.1797	0.0747	0.1672	-0.1112
	(0.0743)	(0.1009)	(0.1095)	(0.0736)	(0.1168)	(0.0956)
Age55_64	Reference	Reference	Reference	Reference	Reference	Reference
Part-time employment	-0.1437***	-0.1489	-0.1383***	-0.0209	0.0298	-0.0349
	(0.0403)	(0.1114)	(0.0483)	(0.0353)	(0.0962)	(0.0331)
Motivation	0.2479***	0.2467***	0.2514***	0.0710**	0.0684	0.0655**
	(0.0402)	(0.0544)	(0.0584)	(0.0302)	(0.0438)	(0.0283)
Employment characteristics						
White-collar worker	0.2270***	0.2649***	0.1918***	0.0929***	0.1095**	0.1094***
	(0.0355)	(0.0445)	(0.0630)	(0.0280)	(0.0435)	(0.0248)
Change	0.1150***	0.1133***	0.1227***	0.0894***	0.1126***	0.0553*
	(0.0296)	(0.0406)	(0.0436)	(0.0270)	(0.0391)	(0.0314)
Experience (divided by 10)	0.0824	0.0377	0.119	-0.2006***	-0.2406**	-0.1619**
	(0.0742)	(0.0953)	(0.1161)	(0.0652)	(0.0959)	(0.0785)
Experience squared	-0.0036**	-0.0017	-0.0053**	0.0027*	0.0034	0.0017
	(0.0016)	(0.0021)	(0.0025)	(0.0014)	(0.0023)	(0.0015)
Micro enterprise	Reference	Reference	Reference	Reference	Reference	Reference
Small and medium-sized enterprise	0.0792*	0.0749	0.0947	-0.0002	-0.0919	0.036
	(0.0443)	(0.0671)	(0.0594)	(0.0390)	(0.0647)	(0.0358)
Large enterprise	0.1758***	0.1707**	0.1928***	0.0087	-0.1053	0.0710*
	(0.0453)	(0.0690)	(0.0609)	(0.0401)	(0.0665)	(0.0405)
Primary sector of industry	0.0637	0.0213	0.1789	0.0122	-0.0619	0.062
	(0.0568)	(0.0669)	(0.1166)	(0.0496)	(0.0576)	(0.0855)
Secondary sector of industry	Reference	Reference	Reference	Reference	Reference	Reference
Tertiary sector of industry	-0.0044	-0.0593	0.1057*	0.0249	-0.046	0.0964***
	(0.0352)	(0.0447)	(0.0574)	(0.0316)	(0.0466)	(0.0297)
Fraction of training by industry	0.6422***	0.5446**	0.7185***			
	(0.1762)	(0.2497)	(0.2463)			
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	1365	761	604	731	390	341

Notes: Marginal effects at the mean; std.errors are in parentheses; *statistically significant at the 0.10 level, **at the 0.05 level, ***at the 0.01 level.

Table A5: Employer-supported and self-financed training: non-monetary costs

	Employer-supported training			Self-financed training		
	Full Sample	Male Workers	Female Workers	Full Sample	Male Workers	Female Workers
Individual characteristics						
No educational degree	Reference	Reference	Reference	Reference	Reference	Reference
Secondary education	0.1590**	0.2482**	0.0808	-0.0141	-0.0912	0.0639
	(0.0761)	(0.1102)	(0.1093)	(0.0515)	(0.0828)	(0.0522)
Tertiary education	0.2753***	0.3049***	0.3002**	0.1701*	0.1042	0.2064
	(0.0837)	(0.1177)	(0.1238)	(0.0975)	(0.1251)	(0.1643)
Male	0.0719**			0.0018		
	(0.0359)			(0.0293)		
Child	-0.0104	0.0513	-0.1007*	-0.0377	-0.0202	-0.0649
	(0.0328)	(0.0419)	(0.0535)	(0.0272)	(0.0336)	(0.0443)
Age25_34	-0.2365**	-0.0229	-0.4457***	-0.0779	-0.1327	-0.1312
	(0.1048)	(0.1499)	(0.1265)	(0.0663)	(0.1001)	(0.0815)
Age35_44	-0.0954	0.0742	-0.2417*	0.0013	-0.0825	0.0078
	(0.0992)	(0.1317)	(0.1384)	(0.0877)	(0.1225)	(0.1502)
Age45_54	-0.0061	0.1038	-0.1317	-0.0015	0.0024	-0.0721
	(0.0762)	(0.1018)	(0.1105)	(0.0643)	(0.1129)	(0.0869)
Age55_64	Reference	Reference	Reference	Reference	Reference	Reference
Part-time employment	-0.1440***	-0.1714	-0.1253**	-0.0002	0.0245	0.0078
	(0.0413)	(0.1113)	(0.0493)	(0.0335)	(0.0825)	(0.0417)
Motivation	0.2212***	0.2133***	0.2490***	0.0830***	0.0763**	0.0796**
	(0.0434)	(0.0588)	(0.0621)	(0.0247)	(0.0316)	(0.0353)
Employment characteristics						
White-collar worker	0.2452***	0.2975***	0.2325***	0.0504*	0.0341	0.0652*
	(0.0359)	(0.0447)	(0.0606)	(0.0281)	(0.0382)	(0.0390)
Change	0.1510***	0.1525***	0.1509***	0.0511**	0.0612*	0.0604*
	(0.0299)	(0.0409)	(0.0442)	(0.0242)	(0.0330)	(0.0333)
Experience (divided by 10)	-0.0446	-0.1471	0.0813	-0.1219**	-0.0882	-0.1778**
	(0.0777)	(0.0986)	(0.1268)	(0.0616)	(0.0854)	(0.0808)
Experience squared	-0.0014	0.0016	-0.0047*	0.0014	0.0004	0.0022
	(0.0017)	(0.0021)	(0.0027)	(0.0013)	(0.0019)	(0.0017)
Micro enterprise	Reference	Reference	Reference	Reference	Reference	Reference
Small and medium-sized enterprise	0.0963**	0.1014	0.0908	-0.0181	-0.1363**	0.0581
	(0.0448)	(0.0691)	(0.0601)	(0.0366)	(0.0614)	(0.0437)
Large enterprise	0.2099***	0.2050***	0.2279***	-0.0396	-0.1856***	0.067
	(0.0454)	(0.0700)	(0.0613)	(0.0350)	(0.0533)	(0.0461)
Primary sector of industry	0.0898	0.0262	0.1904	0.0111	-0.0388	0.1315
	(0.0572)	(0.0664)	(0.1256)	(0.0403)	(0.0405)	(0.1080)
Secondary sector of industry	Reference	Reference	Reference	Reference	Reference	Reference
Tertiary sector of industry	-0.0046	-0.0774*	0.1314**	0.0412	0.0155	0.0801**
	(0.0361)	(0.0453)	(0.0591)	(0.0302)	(0.0423)	(0.0361)
Fraction of training by industry	0.7510***	0.5869***	0.8502***			
	(0.1475)	(0.2072)	(0.2087)			
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002
N	1365	761	604	697	361	336

Notes: Marginal effects at the mean; std.errors are in parentheses; *statistically significant at the 0.10 level, **at the 0.05 level, ***at the 0.01 level.

Table A6: Relation of training decisions

	Employer-supported training		
	Monetary & non-monetary costs	Monetary costs	Non-monetary costs
Individual characteristics			
No educational degree	Reference	Reference	Reference
Secondary education	0.1853**	0.1245	0.1732**
	(0.0796)	(0.0760)	(0.0769)
Tertiary education	0.2833***	0.1848**	0.2769***
	(0.0858)	(0.0841)	(0.0855)
Male	0.0528	0.0291	0.0724**
	(0.0367)	(0.0353)	(0.0360)
Child	0.0097	0.0084	0.0047
	(0.0335)	(0.0321)	(0.0333)
Age25_34	-0.2636**	-0.3024***	-0.2488**
	(0.1072)	(0.1012)	(0.1061)
Age35_44	-0.1235	-0.1985**	-0.1152
	(0.0976)	(0.0953)	(0.1002)
Age45_54	-0.0371	-0.113	-0.0289
	(0.0739)	(0.0749)	(0.0773)
Age55_64	Reference	Reference	Reference
Part-time employment	-0.1454***	-0.1454***	-0.1478***
	(0.0425)	(0.0403)	(0.0414)
Motivation	0.2160***	0.2296***	0.2152***
	(0.0467)	(0.0421)	(0.0441)
Willingness to pay	0.2267***	0.1700***	
	(0.0458)	(0.0432)	
Lack of time	-0.1447***		-0.1399***
	(0.0298)		(0.0296)
Employment characteristics			
White-collar worker	0.2180***	0.2171***	0.2436***
	(0.0381)	(0.0359)	(0.0361)
Change	0.1502***	0.1143***	0.1511***
	(0.0305)	(0.0297)	(0.0302)
Experience (divided by 10)	-0.0339	0.0831	-0.0239
	(0.0787)	(0.0742)	(0.0786)
Experience squared	-0.0015	-0.0036**	-0.0019
	(0.0017)	(0.0016)	(0.0017)
Micro enterprise	Reference	Reference	Reference
Small and medium-sized enterprise	0.0976**	0.0797*	0.1001**
	(0.0461)	(0.0444)	(0.0450)
Large enterprise	0.1808***	0.1723***	0.2076***
	(0.0461)	(0.0452)	(0.0455)
Primary sector of industry	0.0744	0.0608	0.079
	(0.0557)	(0.0568)	(0.0577)
Secondary sector of industry	Reference	Reference	Reference
Tertiary sector of industry	0.0007	-0.0062	-0.0107
	(0.0369)	(0.0354)	(0.0361)
Fraction of training by industry	0.6911***	0.6443***	0.7082***
	(0.1510)	(0.1756)	(0.1474)
Prob > χ^2	0.0000	0.0000	0.0000
N	1365	1365	1365

Notes: Marginal effects at the mean; std.errors are in parentheses; *statistically significant at the 0.10 level, **at the 0.05 level, ***at the 0.01 level.