

Burgard, Claudia

Working Paper

Gender Differences in Further Training Participation – The Role of Individuals, Households and Firms

Ruhr Economic Papers, No. 320

Provided in Cooperation with:

RWI – Leibniz-Institut für Wirtschaftsforschung, Essen

Suggested Citation: Burgard, Claudia (2012) : Gender Differences in Further Training Participation – The Role of Individuals, Households and Firms, Ruhr Economic Papers, No. 320, ISBN 978-3-86788-369-6, Rheinisch-Westfälisches Institut für Wirtschaftsforschung (RWI), Essen, <https://doi.org/10.4419/86788369>

This Version is available at:

<https://hdl.handle.net/10419/61367>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



RUHR

ECONOMIC PAPERS

Claudia Burgard

Gender Differences in Further Training Participation

The Role of Individuals, Households and Firms

Imprint

Ruhr Economic Papers

Published by

Ruhr-Universität Bochum (RUB), Department of Economics
Universitätsstr. 150, 44801 Bochum, Germany

Technische Universität Dortmund, Department of Economic and Social Sciences
Vogelpothsweg 87, 44227 Dortmund, Germany

Universität Duisburg-Essen, Department of Economics
Universitätsstr. 12, 45117 Essen, Germany

Rheinisch-Westfälisches Institut für Wirtschaftsforschung (RWI)
Hohenzollernstr. 1-3, 45128 Essen, Germany

Editors

Prof. Dr. Thomas K. Bauer
RUB, Department of Economics, Empirical Economics
Phone: +49 (0) 234/3 22 83 41, e-mail: thomas.bauer@rub.de

Prof. Dr. Wolfgang Leininger
Technische Universität Dortmund, Department of Economic and Social Sciences
Economics – Microeconomics
Phone: +49 (0) 231/7 55-3297, email: W.Leininger@wiso.uni-dortmund.de

Prof. Dr. Volker Clausen
University of Duisburg-Essen, Department of Economics
International Economics
Phone: +49 (0) 201/1 83-3655, e-mail: vclausen@vwl.uni-due.de

Prof. Dr. Christoph M. Schmidt
RWI, Phone: +49 (0) 201/81 49-227, e-mail: christoph.schmidt@rwi-essen.de

Editorial Office

Joachim Schmidt
RWI, Phone: +49 (0) 201/81 49-292, e-mail: joachim.schmidt@rwi-essen.de

Ruhr Economic Papers #320

Responsible Editor: Thomas K. Bauer

All rights reserved. Bochum, Dortmund, Duisburg, Essen, Germany, 2012

ISSN 1864-4872 (online) – ISBN 978-3-86788-369-6

The working papers published in the Series constitute work in progress circulated to stimulate discussion and critical comments. Views expressed represent exclusively the authors' own opinions and do not necessarily reflect those of the editors.

Ruhr Economic Papers #320

Claudia Burgard

**Gender Differences in
Further Training Participation**

The Role of Individuals, Households and Firms



RUHR
UNIVERSITÄT
BOCHUM

RUB



Bibliografische Informationen der Deutschen Nationalbibliothek

Die Deutsche Bibliothek verzeichnet diese Publikation in der deutschen Nationalbibliografie; detaillierte bibliografische Daten sind im Internet über:

<http://dnb.d-nb.de> abrufbar.

<http://dx.doi.org/10.4419/86788369>

ISSN 1864-4872 (online)

ISBN 978-3-86788-369-6

Claudia Burgard¹

Gender Differences in Further Training Participation – The Role of Individuals, Households and Firms

Abstract

Using the Socio-Economic Panel (SOEP), this paper investigates the determinants of training participation in Germany, distinguishing between self-initiated and employer-initiated training. Self-initiated training is considered as being a decision within households rather than purely individual. Therefore, in addition to standard training determinants, information on one's own and partner's time use as well as on the partner's personal background and his job are taken into account. The results indicate that there are hardly significant gender differences in the determinants of self-initiated training while employer-initiated training of women and men appears to be determined by different factors. A decomposition analysis identifies time use variables, besides job characteristics, as important factors determining the gender gap in employer-provided training participation.

JEL Classification: I29, J16, J24

Keywords: Training; time use; partner characteristics; gender differences

February 2012

¹ RGS Econ, Ruhr-Universität Bochum and RWI. – The author would like to thank Thomas Bauer, Sara de la Rica, Gerhard Glomm, Daniel Hamermesh, Peter Kuhn, Sandra Schaffner as well as participants at the Irish Society of Young Economists 2010, the Scottish Economic Society 2011, the Spring Meeting of Young Economists 2011 and seminars at the RGS Econ, RWI, University of Bilbao and Ruhr-Universität Bochum for helpful comments and suggestions. Financial support by the Ruhr Graduate School in Economics is gratefully acknowledged. – All correspondence to: Claudia Burgard, RGS Econ, Hohenzollernstr. 1-3, 45128 Essen, Germany, E-mail: claudia.burgard@rwi-essen.de.

1 Introduction

Against the background of the ongoing structural, technological and demographic change, workers need to improve their professional skills to remain attractive for the labor market. Jobs require workers to adapt continuously to new and increasing demands which cannot be met with initial schooling qualifications. This is becoming even more important if one takes into account that knowledge and skills are depreciating over time. Furthermore, the transition to a knowledge- and service-based society comes along with a growing demand for skilled workers. To cope with these challenges, further training is an important and appropriate instrument. In fact, lifelong learning is a highly discussed and policy relevant topic. This is reflected by the work programme “*Education and Training 2020*” (ET 2020), a policy framework for European cooperation in education and training, which aims at intensifying, improving and increasing lifelong learning.

Empirical findings support increasing adult training participation being a reasonable policy aim. A large number of studies on the effects of further training finds positive impacts on e.g. career perspectives, employment probability or wages (see e.g. Lynch (1992); Parent (1999); Arulampalam and Booth (2001); Schøne (2004); Frazis and Loewenstein (2005); Kuckulenz and Maier (2006); Pergamit and Veum (1999); Melero (2010); Büchel and Pannenberg (2004)). However, returns to training as well as the determinants of training participation differ between persons.

Thus, a well-directed policy has to go beyond solely increasing overall participation rates of further training. It is crucial to know details about training participation behavior of different subgroups of employees, such as males and females. It is of further importance to know whether they are treated differently by their employers. Hence, it is fundamental to identify differences in the determinants of training of certain groups in order to assure them of the opportunity to perform well in a changing economy.¹ The analysis of gender differences in both, training decisions made by individuals and by employers is a central aim of the present paper.

¹Duncan and Hoffman (1979) examine training determinants of four subgroups and underline that the analysis of the determinants of training is essential. Investigation of the latter fundamentally contributes, amongst other things, to the analysis of the gender wage gap which has continuously been of outstanding high importance over decades. Many theoretical explanations of race and gender wage differences assume the validity of training models. A quintessence of Johnson and Stafford (1974) also refers to this issue. They state that due to increasing home production and decreasing market work married women face less on-the-job training and are, therefore, disadvantaged in salaries.

Another central aspect in this study is the time allocation of couples within a household. Labor market behavior of many women is still crucially dependent on their family situation which is not often the case for men. Although the length and intensity of lifetime labor force participation of women has already increased significantly (even more among those having children)², the traditional “main bread winner concept” is still widespread which might also transfer to training activity. Besides monetary training costs, time forms one part of non-monetary training costs. Training courses can take place inside or outside working hours. Even if training is often supported by employers by allowing participation (partly) during working time, many employees have to spend their free time on further training, e.g. on attending course lessons or on self-studying for the training course. As this time is additional to their usual working time, individuals have to reallocate time for other things outside their working hours. Backes-Gellner and Tuor (2009) support the hypothesis that time plays a crucial role as a cost component of training, as they conclude time being an even more binding restriction in training decisions if compared to monetary costs.

While (self-organized) training is often seen as an individual decision, time allocation decisions in general are usually made within a household. Time needed for housework, errands or child care, for instance, is likely to be shared in some way, i.e. own time use decisions depend on those of the partner. If job plans and decisions about time constraints are made together by both partners of a couple, human capital investments, in particular self-initiated training investments, can be seen as decisions that are influenced by spouses rather than pure individual decisions.

Besides time as a non-monetary cost component, training participation is further determined by monetary training costs. In Germany, training is predominantly financed by employers, followed by individuals (DIE Bonn, 2008). By giving financial support to their workers, firms also play an important role in many training decisions. It is likely that training decisions (partly) made by employers are determined differently compared to self-initiated training. It rather reflects what workers receive from their employers. For both types of training, it will be investigated whether there are differences between wives and husbands regarding the correlation of training determinants with training participation.

In this paper, additional to standard determinants of training participation, the following factors are regarded as influential. First, one’s own as well as the partner’s time use for alternative activities might matter since they constitute time constraints. Second, the

²Also interruptions in women’s working lives are fewer and shorter (Kluge and Tamm, 2009).

partner's labor market characteristics like income or working hours could affect the own training participation but are also usually omitted in training analyses. This could imply that important channels through which the training decision is made might be ignored.

The remainder of the paper is as follows. The next section provides theoretical background and reviews relevant literature while section 3 describes the data and provides descriptive statistics. Section 4 presents estimation results and finally, section 5 discusses and concludes.

2 Theory and Literature

Following the theory of human capital (Becker, 1964), training is an investment in human capital which is undertaken if the expected discounted returns exceed the respective costs. According to human capital theory, training investments result in higher productivity and higher income of workers. Another key prediction of the theory is that men participate more often in training than women due to their larger horizon of returns which arises from longer average time spent in the labor market. This argument is based on the standard logic of investments: The longer the payback period, the more profitable will an investment be (other things equal). There are further theoretical alternatives that might explain a gender gap in training participation (compare e.g. Dieckhoff and Steiber (2009)). Among those are e.g. institutional circumstances, i.e. family policies regarding public child care provisions. Training differences might also be due to the fact that because of traditional gender roles men are seen as main breadwinners and consequently do more training activities. Further, gender segregation might cause a gender training gap because women may work predominantly in occupations that require less on-the-job training. Lastly, employer discrimination can induce different training participation rates between the sexes.

Respecting employers' training investments, human capital theory predicts that they provide more training to males than to females because of their longer average payback period. Gender has often been seen as a signal for the quit probability of an (potential) employee which might result in discriminatory behavior of employers. Two main types of discrimination theories are distinguished in the literature. First, there are taste-based models which treat discrimination as a personal prejudice of employers (Becker, 1957). Second, models of statistical discrimination are based on the assumption that firms are lacking complete information on the true productivity of workers (Phelps, 1972; Arrow, 1973). Arrow (1973) introduced beliefs instead of preferences as an explanation for

discrimination by employers. The central idea of the theory is that they use observable characteristics like the gender of the person as an approximation for the unobservable productivity (Aigner and Cain, 1977). While standard theory of discrimination refers to hiring decisions of firms and focuses on productivity as a crucial factor that firms would like to access, in the case of training decisions this factor is future firm attachment of the workers. According to Backes-Gellner et al. (2011), firms use current employment status (full/part time) as an indicator and additionally take previous statistical experience on the worker's group identity (e.g. gender) into account.

There exists an extensive empirical literature on gender differences in the determinants of training participation which does, however, not yield a clear consensus about the direction of a (alleged) gender training gap. Earlier studies often find an advantage for males in training participation which could be due to the fact that womens' working lives usually have been shorter and discontinuous compared to males' because of child rearing and household responsibilities. The time spent on those activities might influence mens' and womens' behavior and possibilities regarding training in a different way. According to Becker (1985), child care and household responsibilities significantly affect labor market behavior of women. That also includes that married women might seek jobs which supposedly require less training. Men might more likely attend courses aiming at income growth or a better job in order to improve their capability to support their family. However, female training participation has increased during the last years and there are more recent studies confirming that development. Since this topic has already been widely discussed in the literature, it will be abstained from describing those studies in detail.³

Evidence with respect to employer-provided training is also mixed, but more homogeneous than the empirical literature on training and gender in general. Most studies find that women have lower participation rates (e.g. Bishop (1996); Knoke and Ishio (1998); OECD (2003)). Fitzenberger and Muehler (2011) analyze the gender gap in company-provided formal training using data from a single company in Germany. According to their results, the gender gap in favor of males varies with age and is largest at the age of 35. By contrast,

³Examples for papers finding higher training participation among men in Germany are Schmidt (1995); Kuckulenz (2006), McIntosh (1999) for Germany and three other European countries, and Dieckhoff and Steiber (2009) for European Countries (pooled). Evidence is also found for Sweden and Great Britain by several authors. By contrast, higher female training participation is found by e.g. Greenhalgh and Mavrotas (1994, 1996); Green and Zanchi (1997); Shields (1998) for the UK, by Jones et al. (2008) for Great Britain, and by Bassanini et al. (2007); Arulampalam et al. (2004) for at least some types of training and for some countries using the ECHP. The same holds for Australia and the United States. Leber and Möller (2007) do hardly find any gender difference for Germany.

Veum (1996) does not find any gender differences using the NLSY and Lynch (1991) finds that women receive more company training.

In most of the cases, including the present study, it cannot be concluded with certainty that a gender gap after controlling for relevant worker and firm characteristics is due to (taste) discrimination. For that purpose, a perfect and complete set of control variables would be needed which is hardly possible in practice. For example, relevant controls would need to contain unconfounded measures of productivity and firm attachment of the workers (Dieckhoff and Steiber, 2009).

Turning to the link between the time allocation within a household and training investments, household decision making models can provide theoretical background. In particular by assuming a bargaining process within the household, cooperative models (see e.g. Manser and Brown (1980); McElroy and Horney (1981); Lundberg and Pollak (1993)) imply interdependencies between household members' decisions. This strengthens the assumption that also human capital decisions, including training decisions, are not made independently of the partner's preferences and his or her time allocation. The decision unit considered in this paper is the individual and not the household, however, taking into account interdependencies. That is consistent with Mincer and Polachek (1974) who point out that time use for market and nonmarket activities, i.e. also human capital investments, is an intra-family issue because of interdependencies between its members. According to the standard approach of a life cycle model of human capital accumulation, human capital investments are determined, amongst other things, by time spent on accumulating it (compare e.g. Ben-Porath (1967)). This will also hold for further training participation since it represents accumulation of human capital.

The underlying notion of the empirical analysis below is basically in line with an extension of Chiappori (1992), Apps and Rees (1997), which utilizes the crucial insight that time not spent in market labor supply is used for both household production as well as for pure leisure. The idea of this distinction came up first by Mincer (1962), at least for the case of women, and later by Becker (1965) and Gronau (1977). Even more suitable particularly with respect to the investigation in this paper appears the idea presented in Huber and Huemer (2009) who suggest to extend the above concept further. They additionally regard training as an own component of the total amount of time. They present a two person/two period collective household model in which individuals gain utility from consumption and from home production and can choose to allocate their time between

home production, working, and training. Under the assumptions of wages being higher for males and training having no direct financial or utility costs, they derive the following predictions from this model: Single men and women should have equal probabilities of training participation while for married women it should be lower than for married men.

Other studies on time use of households provide similar empirical findings. Womens' home responsibilities tend to discourage their investments in human capital. E.g. Hersch and Stratton (1994) argue that the training decision is likely to be influenced by the time devoted to household activities and by the anticipation of the latter. According to their findings based on the Michigan Panel Study of Income Dynamics, wives consume a substantially higher amount of time for housework and child care than their husbands which is partly due to their lower earnings. However, since more time spent on housework reinforces lower earnings because of lower human capital investments, those aspects are mutually dependent and result in a vicious circle. Kimmel and Connelly (2007) analyze mothers' time choices using the 2003 and 2004 American Time Use Survey while accounting for husband's earnings in their regressions. One of their findings is that higher husband's earnings reduce the mother's hours of work and increase time used for caregiving. Grönlund (2011) examines the relationship between gender, occupations and on-the-job training investments, focusing amongst other things on occupational segregation and on within-household specialization. She argues that women tend to do jobs in which less on-the-job training is required because of being excluded from more training-intensive jobs. Supposing on-the-job training being related to within-household division of work, her results do not confirm this hypothesis. The investigation is based on cross-sectional Swedish data where on-the-job training comprises both formal and informal training and intra-household specialization is measured by motherhood, work interruptions and housework.

3 Data and Empirical Strategy

The empirical analysis in this paper is based on data from the SOEP⁴. The SOEP is a representative annual longitudinal data set which started in 1984. The most recent wave, 2010, comprises more than 19,000 persons living in about 11,000 households. It includes a large set of personal characteristics, like demographic and socioeconomic characteristics,

⁴The dataset was extracted using PanelWhiz. See Haiken-DeNew (2007) and Haiken-DeNew and Hahn (2010). For more information on the SOEP, please see <http://www.diw.de/soep>. Any data or computational errors in this paper are my own.

educational background and the occupational situation of individuals and their partners. As training information is not collected regularly and the questionnaire was modified over time, I use three waves of the dataset, i.e. 2000, 2004 and 2008, since these waves provide comparable information on further training. Following the questionnaire, (further) training is defined as participation in professionally oriented courses during the last three years. The data allows to observe detailed course characteristics of the last three courses, e.g. the financing of the courses and the timing, i.e. whether the training took part (partly) during or outside working hours. This enables analyzing alternative dependent variables, which are defined as self-initiated and employer-initiated courses, respectively. Self-initiated (or employee-initiated) courses are defined as being either (partly) self-financed by the individual and/or outside working hours. Employer-initiated (or firm-provided) training is defined as training that is financed either directly by employers or that takes place during working time.

The estimation sample consists of couples living together in one household where both partners are full- or part-time employed and aged between 18 and 64 years. The sample excludes marginally employed persons, apprentices, public servants and self-employed persons. The remaining sample, after dropping missing values, contains 7,116 observations.

Table 1: **Gender differences in training**

	Males	Females	Difference	t-value ¹	Obs.
Any training (in %)	30.1	28.9	1.2	1.06	7,116
Self-initiated training (in %)	10.6	14.3	-3.7***	-4.77	7,116
Employer-initiated training (in %)	24.3	19.8	4.5***	4.62	7,116
Conditional on participants²:					
Self-initiated training (in %)	35.3	49.6	-14.3***	-6.69	2,102
Employer-initiated training (in %)	80.9	68.4	13.5***	6.65	2,102

Note: ¹ t-value of t-test for mean comparison. ²1,077 males, 1,025 females.

Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 1 shows sample means of training participation in different types of courses separated by gender⁵. The average training participation in any course during the last three years is slightly higher among men (30.1%) than among women (28.9%) while the difference is not statistically significant. When considering different forms of training, an interesting observation can be made. Females' average participation rate in self-initiated

⁵The shares of self- and employer-initiated training do not sum up to the share of "any training" since persons who attended more than one course might have participated in both types of training.

courses is significantly higher than that of males (14.3% females vs. 10.6% males), while men participate significantly more often in employer-provided courses (24.3% males vs. 19.8% for females). The lower part of the table shows the corresponding shares conditional on training participants which confirm that pattern.

Table 2: **Partner characteristics (weighted means)**

	Males'	Females'	Difference	t-value¹	Obs.
	partners	partners			
Age	41.7	44.0	-2.3***	-6.98	6,988
German	0.881	0.886	-0.005	-0.34	6,988
Years of education	11.6	11.7	-0.1	-0.66	6,988
Unlim. contract	0.921	0.946	-0.024**	-2.63	6,988
Job change	0.174	0.113	0.061***	5.00	6,988
Hourly wage	13.8	18.5	-4.7***	-15.30	6,988
Tenure	9.7	12.1	-2.4***	-6.48	6,988
Blue collar worker	0.247	0.515	-0.268***	-14.03	6,988

Note: ¹ t-value of weighted t-test. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.

As mentioned earlier, in the empirical analysis influences of partner characteristics will be taken into account. Table 2 presents mean values of selected partner variables for men and women separately. Regarding age, wage, and firm tenure, the largest significant gender differences can be observed. On average, male spouses are about two years older, their hourly wage is about 30% higher than that of wives, and they are employed for a longer time at the same firm. These differences are rather in line with what we expect.

In Table 3, average hours spent on certain activities on a normal weekday are shown. Once more, gender differences are presented. It becomes apparent that there are differences in time use for working (job), housework and (child) care. Like expected from a traditional task allocation, male spouses spend more time on market work while female spouses are more dedicated to housework and (child) care. Regarding time use for errands/repairs, training and leisure, there are hardly any gender differences observable.

In the empirical framework, binary training indicators are modeled as functions of individual and partner characteristics. In particular, the estimations are based on the following model:

$$T_{it} = \alpha_0 + Z_{it}\beta + U_{it}\gamma + P_{it}\delta + \epsilon_{it}, \quad (1)$$

Table 3: **Partner's time use (in hours per day; weighted means)**

	Males'	Females'	Difference	t-value¹	Obs.
	partners	partners			
Time Use: Job	7.3	9.6	-2.3***	-27.33	6,988
Time Use: Errands/Repairs	1.7	1.6	0.1***	2.70	6,988
Time Use: Housework	2.2	0.7	1.5***	42.51	6,988
Time Use: (Child) care	1.8	0.7	1.1***	9.07	6,988
Time Use: Training	0.1	0.1	-0.0*	-1.56	6,988
Time Use: Leisure	1.5	1.5	0.0	0.73	6,988

Note: See Table 2.

where the subscripts i denote individuals and t the year in the panel data set. Training participation T (alternatively: participation in self-initiated training and in employer-initiated training) is assumed to be determined by control variables Z , time use variables U and partner variables P . In detail, the set of control variables X includes nationality (dummy), West German (dummy), age, age of the youngest child (dummies for children aged 1 to 6 or 7 to 18), years of education, having an unlimited work contract (dummy), job change during last year (dummy), hourly wage, tenure of being employed at the current firm, blue collar worker (dummy), firm size and industry dummies. Furthermore, time use variables (time use for job, errands/repairs, housework, and (child) care) and partner characteristics are included while the latter comprise the same set of personal, work-related and time use variables as mentioned above. Exceptions are nationality and age of the partner which are included in a modified way in order to avoid multicollinearity. Nationality is captured by dummy variables indicating no, one, or both partners being Non-German and partner's age is represented by the difference to the respondent's age. Finally, ϵ_{it} is an idiosyncratic error term. The variables used in the analyses are described in Table A.1 in the Appendix and Table A.2 offers an overview over their means and standard deviations.

Since the information on training reported at the day of the interview refers to the previous three years, the control variables are included as lags (of magnitude 1 to 4), i.e. from points in time prior to course participation. The magnitude of the control variable lags is defined for each training participant individually, based on information on the last three training courses. Controls are measured one year before an individual's first observable course. For example, if a person reported in 2008 having participated in training in 2008 and 2007, controls from the wave 2006 are included. In order to maintain comparability, lags are also used for non-participants. Since an unambiguous starting year does not exist for non-participants (as they did not participate in any course), lags are assigned "ran-

domly". In doing so, the same distribution over the values of the lags as within the group of participants is maintained.⁶

The regression model is estimated by binary Logit. In the first part of the analysis, the regressions are carried out separately for men and women in order to investigate heterogeneity between the sexes regarding the influence of the training determinants.⁷ Since time use and partner variables are expected to be endogenously determined by unobservable characteristics, the estimated coefficients could be biased. This is why the regression results presented below have to be seen as descriptive evidence rather than causal effects. However, we can get interesting insights into correlations between time use variables as well as partner characteristics and training participation. It is particularly focused on whether these correlations differ significantly by gender.

The second step of the analysis investigates gender differences in the probability of attending self- or employer-initiated training, respectively. To this end, the observed gender differences are decomposed using a Blinder-Oaxaca-type decomposition for non-linear models (compare e.g. Bauer and Sinning (2008):

$$\overline{P(T_m)} - \overline{P(T_f)} = \left(F(\bar{X}_m\beta_m) - F(\bar{X}_f\beta_m) \right) + \left(F(\bar{X}_f\beta_m) - F(\bar{X}_f\beta_f) \right) \quad (2)$$

where X comprises explanatory variables and β the corresponding coefficients. m and f indicate the group membership, i.e. males or females. The raw difference in mean training probabilities on the left-hand side is decomposed into the following two parts: The first term on the right-hand side represents the so-called "explained part" which expresses the part of the gap that can be explained by differences in characteristics between the two groups. The second term on the right-hand side represents the "unexplained part" which can be interpreted as differences in the returns to observable characteristics.⁸ To get insights into the composition of the gap, certain sets of covariates are formed such that their contribution to explaining the gap in training participation can be analyzed.

⁶As the assignment of lags could be viewed as kind of arbitrary, there have been conducted robustness checks applying another method which is chosen by Wilkens and Leber (2003). They measure the control variables at the beginning of the three-year reference period for all non-participants. For participants they proceed equally. The main results are not affected by changing the timing of the controls.

⁷As it might be argued that a simultaneous regression framework would be more appropriate to be applied, it was also estimated. The main results are not affected.

⁸One general drawback of the decomposition is its sensitivity with respect to the base group. However, if females instead of males are chosen as base group, the decomposition results of this paper are not affected.

4 Results

This section first presents results from Logit estimations of training participation in self-initiated training and employer-initiated training. The results are shown separately for men and women in Tables 4 and 5, respectively, which contain three different specifications each. This first part of the analysis focuses on gender differences in the correlation between the probability of training participation and certain determinants which are highlighted as bold numbers.⁹ Secondly, a Blinder-Oaxaca decomposition of gender differences in training is conducted.

The first striking observation is that there are clearly less significant gender differences in the relation between the covariates and self-initiated training compared to employer-initiated training (see Tables 4 and 5). This suggests that male and female spouses having the same observable characteristics do not behave very differently when it comes to courses which they have to pay for themselves and/or attend during their freetime. By contrast, comparable males and females living with their partner exhibit differences in participation in training which is paid by their employers or taking place during working time. This suggests that employer-initiated training, in contrast to self-initiated training, is determined differently for male and female spouses.

As a first step and for reasons of comparison, time use and partner variables are not included in the baseline specification (except for time use for job which represents working time to a large extent and therefore should be included as a basic determinant of training). Table 4 shows that the standard determinants of training captured in model (1) do not show any significant gender differences in their correlation with self-initiated training. After including time use variables (model (2)), differences in the association between both own and partner's time spent on work and self-initiated training appear. While for males there is a positive relation between own time use for job and training, for females it is positive regarding their partner's time use for job. This remains the same after including further partner characteristics which are all insignificant (model (3)).

When analyzing employer-initiated training (Table 5), already in model (1) gender differences can be found. The relationship between age, having children under the age of 6, and working in a blue collar occupation and employer-provided training are significantly different for male and female spouses. This means, for example, that women

⁹To test for significant differences between males and females, a Wald test is used.

having children under the age of 6 or having a blue collar occupation receive on average less employer-support for training than men. The former finding could reflect the theoretical argument that females, mostly those with children, spend less time in the labor market which leads to less profitable human capital investments on average. After including time use variables (model (2)), it can be additionally seen that own time use for housework is negatively and partner's time use for housework is positively correlated with employer-provided training only for females but not for males. This gender difference is significant and is consistent with the proposition by Becker (1985) that home responsibilities of women influence their labor market behavior. A relation between the time use of their partner and training probability of employer-provided courses is only observed for women but not for men.

Since including the remaining partner characteristics does again not change much, model (2) is considered the preferred model. The signs of the covariates usually analyzed are mainly in line with the existing literature. For example, training participation has often been found to decrease in age. Higher wages are positively correlated with training participation while the opposite occurs for blue collar jobs. This holds for both types of training, different specifications and both sexes.

In the following part, gender differences in the probabilities of participating in self- or employer-initiated training courses are investigated. The results of Blinder-Oaxaca decompositions corresponding to models (1) and (2) from the regression tables are presented in Tables 6 and 7, respectively.¹⁰ The raw gap between females and males in the training probability is negative for self-initiated training and positive for employer-initiated training (-3.7%-points and 4.5%-points). I.e. without conditioning on any covariates, females participate more often in self-initiated courses while males receive more employer-provided training. Table 6 shows that the gender difference in self-initiated training is largely explained while the difference in employer-initiated training is mostly unexplained by standard determinants (model (1)). A large unexplained part can be attributed to several reasons. It might be due to relevant factors that are not included in the analysis or can also be due to discrimination. The observed gaps are not unambiguously in line with predictions from theory which were presented above. Human capital theory, for example, can only explain the gap in favor of males, which is found for employer-provided training. Further, the gaps in a sample of couples are not in line with model predictions by Huber and Huemer (2009). However, the theoretical approaches do not distinguish between dif-

¹⁰For the decomposition the Stata ado file *oaxaca* by Jann (2008) (August 2011 version) was used.

ferent types of training which lets the converse gaps in this study appear.

The contributions of certain groups of variables to explaining the gaps can be seen in the lower part of the Table.¹¹ In the case of self-initiated training, differences in job characteristics and industries contribute most to the gap, and different personal characteristics to a smaller extent. Regarding employer-provided training, the contributions of certain groups of variables neutralize each other. Differences in job characteristics explain about two thirds of the raw gap, i.e. if females had the same jobs as males, the gap would strongly reduce. By contrast, if females had the same personal characteristics and worked in the same industries as males, the gap would be even larger. This results in a relative small explained part. Turning to model (2), which contains the time use variables (Table 7), reveals that the before mostly unexplained gap can now be explained to a larger and significant part. The time use variables of the respondent account for about half of the raw gender gap in employer-provided training. That means, if females exhibited the time use patterns of males, the gap would reduce by about half. The decomposition results respecting self-initiated training are not largely affected by including time use variables.

The above presented findings suggest that the converse gender gaps in self-initiated and employer-initiated training can both be explained by observable characteristics. The fact that, after accounting for time use variables, the unexplained part of the employer-provided training gap is insignificant, could indicate that employer discrimination is not an explanation for the finding that male spouses receive more employer-support than female spouses. However, it cannot be ruled out that discrimination could also be reflected in the explained part in the case that the time allocation within a household is already a result of discrimination. Still, there is evidence for different time use patterns of men and women as an important explaining factor.

¹¹Detailed decompositions for single variables are shown in Tables A.3 and A.4 in the Appendix.

Table 4: Logit estimations of participation in self-initiated training

	(1)		(2)		(3)	
	Males	Females	Males	Females	Males	Females
German	0.018 (0.02)	0.021 (0.03)	0.015 (0.02)	0.016 (0.03)		
West Germany	-0.041*** (0.01)	-0.068*** (0.02)	-0.043*** (0.01)	-0.064*** (0.02)	-0.041*** (0.01)	-0.062*** (0.02)
Age	-0.003*** (0.00)	-0.003*** (0.00)	-0.004*** (0.00)	-0.003*** (0.00)	-0.004*** (0.00)	-0.003*** (0.00)
Age youngest ch.: 1-6	-0.013 (0.02)	-0.048** (0.02)	-0.020 (0.02)	-0.042 (0.03)	-0.023 (0.02)	-0.043 (0.03)
Age youngest ch.: 7-18	-0.007 (0.01)	0.005 (0.01)	-0.013 (0.01)	0.004 (0.01)	-0.014 (0.01)	0.005 (0.01)
Years of education	0.004 (0.00)	0.009*** (0.00)	0.004* (0.00)	0.009*** (0.00)	0.002 (0.00)	0.009*** (0.00)
Unlim. contract	-0.006 (0.02)	-0.021 (0.02)	-0.007 (0.02)	-0.020 (0.02)	-0.006 (0.02)	-0.018 (0.02)
Job change	0.028* (0.02)	0.005 (0.02)	0.029* (0.02)	0.003 (0.02)	0.028* (0.02)	0.003 (0.02)
ln(Hourly wage)	0.045*** (0.01)	0.070*** (0.02)	0.048*** (0.01)	0.075*** (0.02)	0.045*** (0.01)	0.075*** (0.02)
Tenure	0.000 (0.00)	-0.002* (0.00)	-0.000 (0.00)	-0.002* (0.00)	-0.000 (0.00)	-0.002** (0.00)
Blue collar	-0.065*** (0.02)	-0.119*** (0.02)	-0.067*** (0.02)	-0.119*** (0.02)	-0.065*** (0.02)	-0.116*** (0.02)
Time Use: Job	0.004 (0.00)	-0.004 (0.00)	0.006* (0.00)	-0.002 (0.00)	0.006* (0.00)	-0.002 (0.00)
Time Use: Errands/Repairs			0.009* (0.00)	0.006 (0.01)	0.009* (0.00)	0.006 (0.01)
Time Use: Housework			0.008 (0.01)	0.007 (0.01)	0.008 (0.01)	0.007 (0.01)
Time Use: (Child) care			-0.000 (0.00)	0.001 (0.00)	-0.001 (0.00)	0.001 (0.00)
P - Time Use: Job			-0.003 (0.00)	0.009** (0.00)	-0.004 (0.00)	0.009** (0.00)
P - Time Use: Errands/Repairs			0.000 (0.01)	0.010* (0.01)	0.001 (0.01)	0.010* (0.01)
P - Time Use: Housework			0.005 (0.01)	0.009 (0.01)	0.007 (0.01)	0.009 (0.01)
P - Time Use: (Child) care			-0.001 (0.00)	-0.006 (0.01)	-0.001 (0.00)	-0.006 (0.01)
P - Time Use: Training			0.008 (0.01)	0.009 (0.01)	0.004 (0.01)	0.008 (0.01)
One partner German					-0.010 (0.03)	-0.022 (0.03)
Both partners Non-German					-0.024 (0.03)	-0.035 (0.04)
Diff. own and partner's age					0.001 (0.00)	0.001 (0.00)
P - Unlim. contract					-0.001 (0.02)	0.024 (0.03)
P - Job change					-0.006 (0.02)	0.030 (0.02)
P - Years of education					0.004 (0.00)	0.001 (0.00)
P - ln(Hourly wage)					0.012 (0.01)	-0.012 (0.02)
P - Tenure					-0.000 (0.00)	0.001 (0.00)
P - Blue collar worker					0.000 (0.02)	-0.006 (0.02)
P - Firm size	No	No	No	No	Yes	Yes
P - Industry dummies	No	No	No	No	Yes	Yes
Pseudo-R ²	0.077	0.103	0.082	0.109	0.090	0.114
Log-Likelihood	-1,118	-1,306	-1,111	-1,297	-1,102	-1,290
Obs.	3,577	3,539	3,577	3,539	3,577	3,539

Note: Table shows marginal effects. Industry, firm size and year effects are included. Clustered SEs (at individual level) in parentheses. Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 5: Logit estimations of participation in employer-initiated training

	(1)		(2)		(3)	
	Males	Females	Males	Females	Males	Females
German	0.039 (0.03)	0.100*** (0.04)	0.037 (0.03)	0.100*** (0.04)		
West Germany	-0.047** (0.02)	-0.050*** (0.02)	-0.041** (0.02)	-0.047*** (0.02)	-0.031 (0.02)	-0.045** (0.02)
Age	-0.005*** (0.00)	-0.002** (0.00)	-0.006*** (0.00)	-0.002* (0.00)	-0.005*** (0.00)	-0.002** (0.00)
Age youngest ch.: 1-6	0.021 (0.02)	-0.037 (0.02)	0.072** (0.03)	-0.007 (0.03)	0.073** (0.03)	-0.002 (0.03)
Age youngest ch.: 7-18	0.021 (0.02)	-0.012 (0.02)	0.044** (0.02)	0.005 (0.02)	0.042** (0.02)	0.007 (0.02)
Years of education	0.002 (0.00)	0.003 (0.00)	0.002 (0.00)	0.001 (0.00)	-0.001 (0.00)	0.003 (0.00)
Unlim. contract	0.114*** (0.04)	0.094*** (0.03)	0.112*** (0.04)	0.094*** (0.03)	0.113*** (0.04)	0.093*** (0.03)
Job change	0.045* (0.02)	0.004 (0.02)	0.044* (0.02)	0.002 (0.02)	0.038* (0.02)	-0.001 (0.02)
ln(Hourly wage)	0.113*** (0.02)	0.090*** (0.02)	0.120*** (0.02)	0.084*** (0.02)	0.117*** (0.02)	0.090*** (0.02)
Tenure	0.001 (0.00)	-0.001 (0.00)	0.001 (0.00)	-0.001 (0.00)	0.001 (0.00)	-0.001 (0.00)
Blue collar	-0.124*** (0.02)	-0.170*** (0.03)	-0.124*** (0.02)	-0.162*** (0.03)	-0.116*** (0.02)	-0.161*** (0.03)
Time Use: Job	0.008* (0.00)	0.011*** (0.00)	0.009** (0.00)	0.005 (0.00)	0.008* (0.00)	0.006 (0.00)
Time Use: Errands/Repairs			0.008 (0.01)	-0.002 (0.01)	0.008 (0.01)	-0.002 (0.01)
Time Use: Housework			0.014 (0.01)	-0.023*** (0.01)	0.014 (0.01)	-0.024*** (0.01)
Time Use: (Child) care			-0.013** (0.01)	-0.001 (0.00)	-0.013** (0.01)	-0.000 (0.00)
P - Time Use: Job			0.001 (0.00)	0.004 (0.00)	0.001 (0.00)	0.006 (0.00)
P - Time Use: Errands/Repairs			0.005 (0.01)	-0.001 (0.01)	0.005 (0.01)	-0.004 (0.01)
P - Time Use: Housework			-0.002 (0.01)	0.025** (0.01)	-0.001 (0.01)	0.023** (0.01)
P - Time Use: (Child) care			-0.004 (0.00)	-0.009* (0.01)	-0.004 (0.00)	-0.010* (0.01)
P - Time Use: Training			0.006 (0.01)	0.019 (0.01)	-0.000 (0.01)	0.021 (0.01)
One partner German					-0.016 (0.04)	-0.056 (0.03)
Both partners Non-German					-0.036 (0.03)	-0.139*** (0.05)
Diff. own and partner's age					-0.004* (0.00)	0.000 (0.00)
P - Unlim. contract					0.004 (0.03)	0.015 (0.04)
P - Job change					-0.011 (0.02)	0.002 (0.02)
P - Years of education					0.005 (0.00)	-0.003 (0.00)
P - ln(Hourly wage)					-0.008 (0.02)	-0.024 (0.02)
P - Tenure					0.000 (0.00)	0.002** (0.00)
P - Blue collar worker					-0.026 (0.02)	-0.002 (0.02)
P - Firm size	No	No	No	No	Yes	Yes
P - Industry dummies	No	No	No	No	Yes	Yes
Pseudo-R ²	0.102	0.117	0.106	0.127	0.115	0.131
Log-Likelihood	-1,783	-1,555	-1,775	-1,538	-1,757	-1,530
Obs.	3,577	3,539	3,577	3,539	3,577	3,539

Note: See Table 4.

Table 6: **Blinder-Oaxaca decomposition of the gender-training gap**

	Self-initiated		Employer-initiated	
	Coeff.	(Std. Err.)	Coeff.	(Std. Err.)
Overall difference				
Males	0.106***	(0.006)	0.244***	(0.008)
Females	0.144***	(0.007)	0.198***	(0.008)
Difference	-0.037***	(0.009)	0.045***	(0.011)
Explained	-0.029***	(0.007)	0.011	(0.009)
	[78.4%]		[24.6%]	
Unexplained	-0.008	(0.011)	0.034***	(0.013)
	[21.6%]		[75.6%]	
Explained difference				
Personal char.	-0.006***	(0.002)	-0.010***	(0.002)
Children's age	0.000	(0.000)	0.000	(0.000)
Job characteristics	-0.012*	(0.006)	0.030***	(0.010)
Industry dummies	-0.011***	(0.004)	-0.009**	(0.004)
Year effects	0.000	(0.000)	0.000	(0.000)
Unexplained difference				
Personal char.	0.151	(0.660)	-0.117**	(0.059)
Children's age	0.002	(0.021)	0.013*	(0.007)
Job characteristics	-0.147	(0.647)	0.004	(0.069)
Industry dummies	0.050	(0.216)	-0.015	(0.014)
Year effects	0.019	(0.086)	0.004	(0.011)
Intercept	-0.084	(0.407)	0.144*	(0.087)

Note: Decomposition based on specification (1) from Tables 4 and 5.
Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 7: **Blinder-Oaxaca decomposition of the gender-training gap**

	Self-initiated		Employer-initiated	
	Coefficient	(Std. Err.)	Coefficient	(Std. Err.)
Overall difference				
Males	0.106***	(0.006)	0.244***	(0.008)
Females	0.144***	(0.007)	0.198***	(0.008)
Difference	-0.037***	(0.009)	0.045***	(0.011)
Explained	-0.028**	(0.011)	0.028**	(0.012)
	[75.7%]		[62.2%]	
Unexplained	-0.009	(0.014)	0.017	(0.015)
	[24.3%]		[37.8%]	
Explained difference				
Personal char.	-0.007***	(0.002)	-0.010***	(0.002)
Children's age	0.000	(0.000)	0.000	(0.000)
Job characteristics	-0.008	(0.007)	0.025***	(0.008)
Industry dummies	-0.011***	(0.004)	-0.009**	(0.004)
Time Use	-0.010	(0.007)	0.022***	(0.008)
P - Time Use	0.008	(0.006)	0.001	(0.008)
Year effects	0.000	(0.000)	0.000	(0.000)
Unexplained difference				
Personal char.	0.214	(1.249)	-0.105	(0.064)
Children's age	0.015	(0.090)	0.013	(0.009)
Job characteristics	-0.220	(1.292)	0.068	(0.069)
Industry dummies	0.054	(0.316)	-0.010	(0.012)
Time Use	-0.025	(0.155)	0.029*	(0.017)
P - Time Use	0.331	(1.911)	-0.027	(0.034)
Year effects	0.024	(0.144)	0.006	(0.009)
Intercept	-0.404	(2.299)	0.045	(0.082)

Note: Decomposition based on specification (2) from Tables 4 and 5.
Significance levels: * p < 0.1, ** p < 0.05, *** p < 0.01.

5 Discussion and Conclusion

This paper examines two types of further training, self-initiated and employer-initiated training, while focusing on gender differences. Using data from the SOEP, a sample consisting of couples is analyzed. The aim is twofold. First, differences in determinants of training participation are analyzed and second, differences in training probabilities are investigated using a decomposition analysis.

In the first part, training participation is considered to be influenced by the time allocation within a household and by the characteristics of one's partner. This is realized by including time use variables and partner variables in addition to standard determinants into the estimation model. Results from Logit estimations show that there are hardly any differences between male and female spouses regarding the correlation of training determinants and the probability of participation in self-initiated training. This finding suggests that, when it comes to courses that individuals mostly decide themselves to participate in, the factors influencing that decision do not differ significantly between men and women. Regarding employer-initiated training, however, the correlations of e.g. time use variables and training probability differ significantly by gender. Women's training probability for employer-provided courses is correlated with the time use of their partner while this is not true for men. Thus, the findings suggest that, in contrast to self-initiated training, the determinants of employer-initiated training differ between the sexes.

Moreover, an analysis of the training participation probability reveals gender differences that cannot be explained by standard observable characteristics only in employer-provided training but not in self-initiated training. This disappears, however, when including own and partner's time use variables. A decomposition analysis supports the important contribution of those variables to explaining the raw gap.

Although causal inference cannot be drawn from the results of this paper, it is interesting to see that the supposition of a differing role of time allocation within households by gender and type of training receives support in the empirical findings. Further, the results with respect to self-initiated training confirm the recently observed trend of increasing female training attendance. It is also shown that the distinction between self- and employer-provided training yields important insights as gender gaps of opposite signs are found.

References

- Aigner, D. J. and G. G. Cain (1977). Statistical Theories of Discrimination in the Labor Market. *Industrial Labor Relations Review* 30(2), 175–187.
- Apps, P. F. and R. Rees (1997). Collective Labor Supply and Household Production. *Journal of Political Economy* 105(1), 178–90.
- Arrow, K. (1973). The Theory of Discrimination. In O. Ashenfelter and A. Rees (Eds.), *In Discrimination in Labor Markets*. Princeton: Princeton University Press.
- Arulampalam, W. and A. Booth (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., A. Booth, and M. Bryan (2004). Training in Europe. *Journal of the European Economic Association* 2(2-3), 346–60.
- Backes-Gellner, U., Y. Oswald, and S. Tuor (2011). Part-time Work and Employer-provided Training: Boon to Women and Bane to Men? Leading House Working Paper 58, The Swiss Leading House on Economics of Education, Firm Behavior and Training Policies.
- Backes-Gellner, U. and S. Tuor (2009). Time – Even More Costly Than Money: Training Costs of Workers and Firms. Leading House Working Paper 46, The Swiss Leading House on Economics of Education, Firm Behavior and Training Policies.
- Bassanini, A., A. Booth, G. Brunello, M. D. Paola, and E. Leuven (2007). Workplace Training in Europe. In G. Brunello, P. Garibaldi, and E. Wasmer (Eds.), *Education and Training in Europe*. Oxford and New York: Oxford University Press.
- Bauer, T. K. and M. Sinning (2008). An Extension of the Blinder-Oaxaca Decomposition to Non-Linear Models. *Advances in Statistical Analysis* 92(2), 197–206.
- Becker, G. S. (1957). *The Economics of Discrimination*. Chicago: University of Chicago Press.
- Becker, G. S. (1964). *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education*. Chicago: University of Chicago Press.
- Becker, G. S. (1965). A Theory of the Allocation of Time. *The Economic Journal* 75(299), 493–517.
- Becker, G. S. (1985). Human Capital, Effort, and the Sexual Division of Labor. *Journal of Labor Economics* 3(1), 33–58.
- Ben-Porath, Y. (1967). The Production of Human Capital and the Life Cycle of Earnings. *The Journal of Political Economy* 75(4), 352–365.
- Bishop, J. H. (1996). What do we Know About Employer Provided Training: A Review of the Literature. In S. Polachek (Ed.), *Research in Labor Economics*, Volume 16, pp. 19–88. JAI Press.
- Büchel, F. and M. Pannenberg (2004). Berufliche Weiterbildung in West- und Ostdeutschland – Teilnehmer, Struktur und individueller Ertrag. *Zeitschrift für Arbeitsmarktforschung* 37, 73–126.
- Chiappori, P.-A. (1992). Collective Labor Supply and Welfare. *Journal of Political Economy* 100, 437–467.
- DIE Bonn (2008). *DIE-Trendanalyse 2008: Trends der Weiterbildung*. Bielefeld: Bertelsmann Verlag.
- Dieckhoff, M. and N. Steiber (2009). In Search of Gender Differences in Access to Continuing Training: Is there a Gender Training Gap and if yes, why? Working paper, Social Science Research Center Berlin (WZB).
- Duncan, G. J. and S. Hoffman (1979). On-The-Job Training and Earnings Differences by Race and Sex. *The Review of Economics and Statistics* 61(4), 594–603.

- Fitzenberger, B. and G. Muehler (2011). Dips and Floors in Workplace Training: Using Personnel Records to Estimate Gender Differences. ZEW Discussion Papers 11-023, Zentrum für Europäische Wirtschaftsforschung (ZEW) Mannheim.
- Frazis, H. and M. A. Loewenstein (2005). Reexamining the Returns to Training: Functional Form, Magnitude, and Interpretation. *Journal of Human Resources* 40(2), 453–476.
- Green, F. and L. Zanchi (1997). Trends in the Training of Male and Female Workers in the United Kingdom. *British Journal of Industrial Relations* 52(2), 179–195.
- Greenhalgh, C. and G. Mavrotas (1994). Workforce training in the thatcher era: market forces and market failure. In R. McNabb and K. Whitfield (Eds.), *The Market for Training: International Perspectives on Theory, Methodology and Policy*, pp. 131–150. Avebury: Aldershot.
- Greenhalgh, C. and G. Mavrotas (1996). Job Training, New Technology and Labour Turnover. *British Journal of Industrial Relations* 34(1), 131–150.
- Gronau, R. (1977). Leisure, Home Production and Work – The Theory of the Allocation of Time Revisited. NBER Working Paper Series 137, National Bureau of Economic Research.
- Grönlund, A. (2011). On-the-Job Training – A Mechanism for Segregation? Examining the Relationship between Gender, Occupation, and On-the-Job Training Investments. *forthcoming in European Sociological Review*.
- Haiken-DeNew, J. P. (2007). PanelWhiz: A Stata Interface for Large Scale Panel Datasets. German Stata Users' Group Meetings 2007 08, Stata Users Group.
- Haiken-DeNew, J. P. and M. Hahn (2010). PanelWhiz: A Flexible Modularized Stata Interface for Accessing Large Scale Panel Data Sets. *Schmollers Jahrbuch* 130(4), 643–654.
- Hersch, J. and L. S. Stratton (1994). Housework, Wages, and the Division of Housework Time for Employed Spouses. *The American Economic Review* 84(2), 120–125.
- Huber, P. and U. Huemer (2009). What Causes Gender Differences in the Participation and Intensity of Lifelong Learning? WIFO Working Papers 353/2009, WIFO.
- Jann, B. (2008). The Blinder-Oaxaca Decomposition for Linear Regression Models. *Stata Journal* 8(4), 453–479.
- Johnson, G. E. and F. P. Stafford (1974). The Earnings and Promotion of Women Faculty. *American Economic Review* 64(6), 888–903.
- Jones, M. K., P. L. Latreille, and P. J. Sloane (2008). Crossing the Tracks? Trends in the Training of Male and Female Workers in Great Britain. *British Journal of Industrial Relations* 46(2), 268–282.
- Kimmel, J. and R. Connelly (2007). Mothers' Time Choices: Caregiving, Leisure, Home Production, and Paid Work. *The Journal of Human Resources* 42(3), 644–681.
- Kluge, J. and M. Tamm (2009). Evaluation des Gesetzes zum Elterngeld und zur Elternzeit - Studie zu den Auswirkungen des BEEG auf die Erwerbstätigkeit und die Vereinbarkeitsplanung. Rwi projektberichte, RWI Essen.
- Knoke, D. and Y. Ishio (1998). The Gender Gap in Company Job Training. *Work and Occupations* 25(2), 141–167.
- Kuckulenz, A. (2006). Continuing Vocational Training in Germany? A Comparative Study Using 3 German Data Sets. ZEW Discussion Papers 06-24, ZEW – Center for European Economic Research.
- Kuckulenz, A. and M. Maier (2006). Heterogeneous Returns to Training. *Jahrbücher für Nationalökonomie und Statistik* 26(1), 24–40.

- Leber, U. and I. Möller (2007). Weiterbildungsbeteiligung ausgewählter Personengruppen. Research Notes of the German Council for Social and Economic Data 8, German Council for Social and Economic Data (RatSWD).
- Lundberg, S. and R. A. Pollak (1993). Separate Spheres Bargaining and the Marriage Market. *Journal of Political Economy* 101(6), 988–1010.
- Lynch, L. M. (1991). The Private Sector and Skill Formation in the United States. Advances in the Study of Entrepreneurship. *Innovation, and Economic Growth* 5, 115–144.
- Lynch, L. M. (1992). Private-Sector Training and the Earnings of Young Workers. *The American Economic Review* 82(1), 299–312.
- Manser, M. and M. Brown (1980). Marriage and Household Decision-Making: A Bargaining Analysis. *International Economic Review* 21(1), 31–44.
- McElroy, M. B. and M. J. Horney (1981). Nash-Bargained Household Decisions: Toward a Generalization of the Theory of Demand. *International Economic Review* 22(2), 333–349.
- McIntosh, S. (1999). A Cross-Country Comparison of the Determinants of Vocational Training. CEP Discussion Papers 0432, Centre for Economic Performance, LSE.
- Melero, E. (2010). Training and Promotion: Allocation of Skills or Incentives? *Industrial Relations* 49(4), 640–667.
- Mincer, J. (1962). On-the-Job Training: Costs, Returns and Some Implications. *Journal of Political Economy* 70(5), 50–79.
- Mincer, J. and S. Polachek (1974). Family Investments in Human Capital: Earnings of Women. *Journal of Political Economy* 82, 76–108.
- OECD (2003). Employment Outlook. *Chapter 5: Upgrading Workers' Skills and Competencies*, Paris, 237–296.
- Parent, D. (1999). Wages and Mobility: The Impact of Employer-provided Training. *Journal of Labor Economics* 17, 298–317.
- Pergamit, M. R. and J. R. Veum (1999). What is a Promotion? *Industrial and Labor Relations Review* 52(4), 581–601.
- Phelps, E. S. (1972). The Statistical Theory of Racism and Sexism. *European Economic Review* 62, 659–661.
- Schmidt, S. W. (1995). Participation in Further Education over the Life Course: A Longitudinal Study of Three Birth Cohorts in the Federal Republic of Germany. *European Sociological Review* 11(2), 187–208.
- Schøne, P. (2004). Why is the Return to Training so High? *Labour* 18(3), 363–378.
- Shields, M. (1998). Changes in the Determinants of Employer-funded Training for Full-time Employees in Britain, 1984–94. *Oxford Bulletin of Economics and Statistics* 60(2), 189–214.
- Veum, J. R. (1996). Gender and Race Differences in Company Training. *Industrial Relations: A Journal of Economy and Society* 35(1), 32–44.
- Wilkens, I. and U. Leber (2003). Partizipation an beruflicher Weiterbildung: Empirische Ergebnisse auf Basis des Sozio-Ökonomischen Panels. *Mitteilungen aus der Arbeitsmarkt- und Berufsforschung* 36(3), 329–337.

A Appendix - Tables

Table A.1: Definition of Variables

Variable	Description
a. Dependent variables	
Self-initiated training	0/1-variable; 1 if respondent participated in a formal training course during the previous three years that was (partly) self-financed or (partly) outside working hours
Employer-initiated training	0/1-variable; 1 if respondent participated in a formal training course during the previous three years that was completely employer-financed and during working hours
b. Explanatory variables	
Demographics	
German	0/1-variable; 1 if nationality is German
West Germany	0/1-variable; 1 if respondent living in West Germany; 0 for East Germany
Age	Age of respondent in years
Age youngest ch: 1-6	0/1-variable; 1 if age of the youngest child between 1 and 6
Age youngest ch: 7-18	0/1-variable; 1 if age of the youngest child between 7 and 18
Age youngest ch: >18	0/1-variable; 1 if age of the youngest child higher than 18
Education/Employment	
Years of education	Length of education in years
Unlimited contract	0/1-variable; 1 if respondent has an unlimited work contract
Job change	0/1-variable; 1 if respondent changed his job during the last year
ln(Hourly wage)	Gross hourly wage (monthly current gross labor income plus additional payments in Euro divided by contractual working hours)
Tenure	Firm tenure in years
Blue collar	0/1-variable; 1 if respondent works in blue collar occupation
Firm characteristics	
Firm size dummies	Firm size in categories: <20; 20-199; 200-1,999; >2,000
Industry dummies	Categories: agriculture, energy, mining; manufacturing; construction; trade; transport; bank, insurance; services
Time Use	
Time Use: Job, Errands/ Repairs, Housework, (Child) care, Leisure	Hours spend on job, errands/repairs, housework, child care or care of other persons in hh, leisure on an average weekday
Partner Variables	
<i>...are indicated by a "P", definitions analogue to above descriptions; further:</i>	
Diff. own/partner's age	Own age minus partner's age
Both partners German	0/1-variable; 1 if both partners are German
One partner German	0/1-variable; 1 if one partner is German and one is Non-German
Both partners Non-German	0/1-variable; 1 if both partners are Non-German

Table A.2: Summary statistics (unweighted sample means)

Variable	Males		Females	
	Mean	Std. Dev.	Mean	Std. Dev.
Training	0.301	0.459	0.290	0.454
Self-initiated training	0.106	0.308	0.144	0.351
Employer-initiated training	0.244	0.429	0.198	0.399
German	0.911	0.284	0.916	0.278
West Germany	0.692	0.462	0.697	0.460
Age	43.9	8.9	41.5	8.6
Age youngest child	4.4	5.9	4.7	6.0
Years of education	12.1	2.7	12.0	2.5
Unlim. contract	0.952	0.213	0.931	0.254
Job change	0.126	0.332	0.152	0.359
Wage	19.6	10.6	14.5	7.1
Tenure	11.9	10.0	9.8	8.4
Blue collar	0.500	0.500	0.223	0.416
Firm size 20-199	0.326	0.469	0.318	0.466
Firm size 200-1,999	0.250	0.433	0.237	0.425
Firm size >2,000	0.242	0.428	0.192	0.394
Ind.: Agricul., energy, mining	0.042	0.201	0.013	0.112
Ind.: Manufacturing	0.304	0.460	0.163	0.369
Ind.: Construction	0.218	0.413	0.044	0.205
Ind.: Trade	0.107	0.309	0.193	0.395
Ind.: Transport	0.068	0.252	0.033	0.178
Ind.: Bank, insurance	0.038	0.192	0.058	0.234
Ind.: Services	0.223	0.416	0.496	0.500
Time Use: Job	9.7	1.7	7.5	2.4
Time Use: Errands/Repairs	1.6	1.3	1.7	1.0
Time Use: Housework	0.6	0.7	2.2	1.2
Time Use: (Child) care	0.6	1.4	1.7	3.1
Time Use: Training	0.1	0.4	0.1	0.4
Time Use: Leisure	1.5	1.2	1.5	1.2
P - Age	41.5	8.6	43.9	8.9
Diff. own and partner's age	2.4	4.0	-2.4	4.0
Both partners German	0.888	0.315	0.889	0.314
One partner German	0.045	0.207	0.048	0.213
Both partners Non-German	0.067	0.250	0.063	0.243
P - Unlim. contract	0.928	0.259	0.951	0.215
P - Job change	0.162	0.369	0.116	0.320
P - Years of education	11.9	2.4	12.1	2.7
P - Wage	14.1	6.9	19.1	10.5
P - Tenure	9.8	8.5	11.8	9.9
P - Blue collar worker	0.218	0.413	0.494	0.500
P - Firm size <20	0.255	0.436	0.188	0.391
P - Firm size 20-199	0.314	0.464	0.321	0.467
P - Firm size 200-1,999	0.238	0.426	0.251	0.434
P - Firm size >2,000	0.193	0.395	0.240	0.427
P - Ind.: Agricul., energy, mining	0.014	0.119	0.045	0.207
P - Ind.: Manufacturing	0.160	0.367	0.302	0.459
P - Ind.: Construction	0.044	0.204	0.212	0.409
P - Ind.: Trade	0.195	0.397	0.111	0.314
P - Ind.: Transport	0.034	0.180	0.067	0.250
P - Ind.: Bank, insurance	0.060	0.237	0.038	0.191
P - Ind.: Services	0.493	0.500	0.226	0.419
P - Time Use: Job	7.5	2.5	9.7	1.7
P - Time Use: Errands/Repairs	1.7	1.0	1.6	1.2
P - Time Use: Housework	2.2	1.2	0.7	0.7
P - Time Use: (Child) care	1.7	3.1	0.6	1.5
P - Time Use: Training	0.1	0.5	0.1	0.5
P - Time Use: Leisure	1.5	1.2	1.5	1.2

Table A.3: Explained difference: Detailed decomposition

	Self-initiated		Employer-initiated	
	Coefficient	(Std. Err.)	Coefficient	(Std. Err.)
Overall difference				
Males	0.106***	(0.006)	0.244***	(0.008)
Females	0.144***	(0.007)	0.198***	(0.008)
Difference	-0.037***	(0.009)	0.045***	(0.011)
Explained	-0.029***	(0.007)	0.009	(0.009)
	[78.4%]		[20.0%]	
Unexplained	-0.009	(0.011)	0.036***	(0.013)
	[24.3%]		[80.0%]	
Year effects	0.000	(0.000)	0.000	(0.000)
Explained difference				
German	0.000	(0.000)	0.000	(0.001)
West Germany	0.000	(0.001)	0.000	(0.001)
Age	-0.007***	(0.002)	-0.010***	(0.002)
Age youngest ch.: 1-6	0.000	(0.000)	0.000	(0.000)
Age youngest ch.: 7-18	0.000	(0.000)	0.000	(0.000)
Years of education	0.000	(0.000)	0.000	(0.000)
Unlim. contract	0.000	(0.000)	0.002**	(0.001)
Job change	0.000	(0.000)	-0.001	(0.000)
ln(Wage)	0.017***	(0.004)	0.033***	(0.006)
Tenure	-0.001	(0.001)	0.001	(0.002)
Blue collar	-0.022***	(0.004)	-0.038***	(0.009)
Time Use: Job	-0.002	(0.004)	0.025***	(0.006)
Firm size 20-199	0.000	(0.000)	0.001	(0.001)
Firm size 200-1,999	0.000	(0.000)	0.001	(0.001)
Firm size \$ > \$2,000	-0.002**	(0.001)	0.007***	(0.002)
Ind.: Construction	-0.005*	(0.003)	-0.002	(0.003)
Ind.: Trade	0.004***	(0.002)	0.003*	(0.002)
Ind.: Transport	0.000	(0.001)	-0.001	(0.001)
Ind.: Bank, insurance	0.000	(0.000)	0.000	(0.001)
Ind.: Services	-0.010***	(0.003)	-0.012***	(0.004)
Unexplained difference				
German	-0.006	(0.108)	-0.047	(0.031)
West Germany	-0.033	(0.171)	0.005	(0.012)
Age	0.215	(1.134)	-0.077*	(0.045)
Age youngest ch.: 1-6	-0.011	(0.057)	0.005*	(0.003)
Age youngest ch.: 7-18	0.012	(0.065)	0.007	(0.005)
Years of education	0.146	(0.766)	-0.007	(0.040)
Unlim. contract	-0.037	(0.210)	0.003	(0.034)
Job change	-0.012	(0.064)	0.004	(0.003)
ln(Wage)	0.103	(0.569)	0.015	(0.060)
Tenure	-0.065	(0.339)	0.011	(0.011)
Blue collar	-0.032	(0.165)	0.013**	(0.007)
Time Use: Job	-0.211	(1.098)	-0.027	(0.033)
Firm size 20-199	-0.040	(0.208)	0.005	(0.008)
Firm size 200-1,999	-0.041	(0.214)	0.004	(0.006)
Firm size \$ > \$2,000	-0.033	(0.170)	0.005	(0.006)
Ind.: Construction	0.007	(0.036)	0.001	(0.002)
Ind.: Trade	0.008	(0.047)	0.005	(0.004)
Ind.: Transport	0.004	(0.021)	-0.001	(0.002)
Ind.: Bank, insurance	0.008	(0.043)	-0.003*	(0.002)
Ind.: Services	0.035	(0.184)	-0.015*	(0.008)
Intercept	-0.057	(0.415)	0.125	(0.088)

Note: See Table 6.

Table A.4: Explained difference: Detailed decomposition

	Self-initiated		Employer-initiated	
	Coefficient	(Std. Err.)	Coefficient	(Std. Err.)
Overall difference				
Males	0.106***	(0.006)	0.244***	(0.008)
Females	0.144***	(0.007)	0.198***	(0.008)
Difference	-0.037***	(0.009)	0.045***	(0.011)
Explained	-0.028**	(0.011)	0.027**	(0.012)
	[75.7%]		[60.0%]	
Unexplained	-0.009	(0.014)	0.018	(0.015)
	[24.3%]		[40.0%]	
Year effects	0.000	(0.000)	0.000	(0.000)
Explained difference				
German	0.000	(0.000)	0.000	(0.001)
West Germany	0.000	(0.001)	0.000	(0.001)
Age	-0.008***	(0.002)	-0.010***	(0.002)
Age youngest ch.: 1-6	0.000	(0.000)	0.000	(0.000)
Age youngest ch.: 7-18	0.000	(0.000)	0.000	(0.000)
Years of education	0.000	(0.000)	0.000	(0.000)
Unlim. contract	0.000	(0.000)	0.002***	(0.001)
Job change	0.000	(0.000)	-0.001	(0.000)
ln(Wage)	0.018***	(0.004)	0.029***	(0.005)
Tenure	-0.002	(0.001)	0.001	(0.001)
Blue collar	-0.023***	(0.004)	-0.034***	(0.005)
Time Use: Job	0.002	(0.005)	0.017***	(0.006)
Firm size 20-199	0.000	(0.000)	0.001	(0.001)
Firm size 200-1,999	0.000	(0.000)	0.001	(0.001)
Firm size \$ > \$2,000	-0.002**	(0.001)	0.006***	(0.002)
Ind.: Construction	-0.005*	(0.003)	-0.002	(0.003)
Ind.: Trade	0.004***	(0.002)	0.003*	(0.002)
Ind.: Transport	0.000	(0.001)	-0.001	(0.001)
Ind.: Bank, insurance	0.000	(0.000)	0.000	(0.000)
Ind.: Services	-0.010***	(0.003)	-0.011***	(0.003)
Time Use: Errands/Repairs	-0.001*	(0.001)	-0.001	(0.001)
Time Use: Housework	-0.010	(0.007)	0.019**	(0.008)
Time Use: (Child) care	0.000	(0.002)	0.007**	(0.003)
P - Time Use: Job	-0.003	(0.005)	-0.005	(0.005)
P - Time Use: Errands/Repairs	0.000	(0.000)	0.000	(0.000)
P - Time Use: Housework	0.012*	(0.007)	0.009	(0.008)
P - Time Use: (Child) care	-0.001	(0.002)	-0.003	(0.003)
P - Time Use: Training	0.000	(0.000)	0.000	(0.000)

Note: See Table 7.