Essays in Personnel Economics – Empirical Analyses on Further Training, Self-Employment Earnings, and Monetary Reference Points

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BAuA	Bundesanstalt für Arbeitsschutz und Arbeitsmedizin
BHPS	British Household Panel Survey
BIBB	Bundesinstitut für Berufsbildung
DIW	Deutsches Institut für Wirtschaftsforschung
ECHP	European Community Household Panel
e.g.	exempli gratia
et al.	et alii
EU	European Union
FE	Fixed-effects
GDP	Gross domestic product
GEM	Global Entrepreneurship Monitor
GSOEP	German Socio-Economic Panel
i.e.	id est
ISER	Institute of Social and Economic Research
IT	information technology
IZA	Forschungsinstitut zur Zukunft der Arbeit
km	kilometer
NLSHS72	National Longitudinal Survey of the High School Class of 1972
NLSY	National Longitudinal Survey of Youth
NSFH	National Survey of Families Households

OECD	Organisation for Economic Cooperation and Development
OLS	ordinary least squares
p.	page
pp.	pages
RE	Random-effects
SE	self-employed
SEPT95	Survey of Employer-Provided Training 1995
SIPP	Survey of Income and Program Participation
US	United States
VAA	Verband angestellter Akademiker und leitender Angestellter der Chemischen Industrie e. V.
vs.	versus
WE	wage-employed
ZEW	Zentrum für Europäische Wirtschaftsforschung

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Þetta Reddast – Everything will be alright!

Icelandic proverb

Having finished this dissertation, I must admit that there were several instances when I felt miserable about my thesis. Insignificant results tormented me and often I was left doubting the appropriateness of theoretical arguments. Nevertheless, there were many people who supported me in this process; they always gave me valuable advice and helped me to realize that in the end, *Þetta reddast*. Indeed, whenever I felt desperate, I thought of this popular Icelandic proverb which literally means: Everything will be alright. And in fact, it was true, everything became alright!

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1 Introduction

Personnel economics is still a rather young area of research. In the view of Lazear (1999), its history started only 25 years ago in 1987 with a special issue of the *Journal of Labor Economics* on the economics of personnel. In the beginning, much of the work was on the development and advancement of theories. Empirical analyses were rather scarce, mostly due to constraints with respect to the availability of appropriate data on the firm level (Baker & Holmstrom, 1995; Lazear, 1999). There is still a lack of empirical work in many fields of personnel economics today. Within the thesis at hand, several research questions are tackled. It consists of three subchapters. The main focus is on a personnel economics perspective, but appropriate arguments of behavioral economics, entrepreneurship, and other neighboring sciences are also used. In the following, the different research questions will be explained in order to give an overview of the whole thesis.

Chapter 2 focuses on **the participation of German employees in further training**. Attendance rates in Germany are rather low in comparison to other countries. Thanks to a sound apprenticeship system, German employees are entering the labor market with a good amount of knowledge. However, it becomes more and more important to refresh and enhance occupational skills and knowledge during the career as ongoing globalization increases the need to maintain productivity both from an employee´s and an employer´s perspective. In addition, the German reunification in 1990 constituted a very special situation in that many workers who had previously worked in a socialistic system suddenly had to adapt to the market economy. Hence, we should observe increased training rates in Germany during the last decades, especially for East Germany after the reunification. Using data of the German Socio-Economic Panel (GSOEP) from 1989 to 2008, the training situation in Germany will be investigated profoundly. In detail, three aspects will be explored:

(1) The development of participation rates for different employee groups over time,
(2) determinants of further training, and
(3) differences between certain forms of further training.

First of all, theoretical arguments concerning the decision on participating in further training will be discussed. This will lead to several hypotheses regarding possible factors that might impact this decision. Afterwards, cross-sectional and panel estimators will be applied in order to explore the empirical relevance of these hypotheses. Using the GSOEP data, it is possible

to draw conclusions for the development of further training in Germany over a very long time span of 20 years. Most notably, the data allows for an in-depth investigation of the time after the reunification.

Subsequently, **effects on individual earnings due to a switch from wage-employment to self-employment** are being examined in chapter 3. Up to now, there are only a small number of contributions based on data of the US labor market which deal with this research topic. They find considerably lower incomes at the beginning of an entrepreneurial occupation. Moreover, earnings increases over time are lower compared to those in wage-employment. These income differentials are mainly explained by substantial non-pecuniary benefits such as a higher degree of individual freedom or a higher task variety at work. However, the theoretical literature offers arguments for higher incomes in self-employment, too. One would expect that entrepreneurs have an advantage over wage-employed workers when it comes to aligning work processes to their own skills. In contrast, this is only possible to a certain extent in firm hierarchies. Hence, the self-employed should ceteris paribus be more productive than the employees. Older OECD data show that earnings of entrepreneurs in Germany are higher than those of wage-employed workers on average. Therefore, GSOEP data from 1984 to 2008 are used in order to investigate the effects on earnings of a switch from wage-employment into self-employment. Thereby, the longitudinal structure of the dataset allows for applying panel estimators which can isolate causal effects. Furthermore, several subgroups of workers are explored in order to get a clear picture of earnings effects of self-employment in Germany.

In chapter 4, **monetary reference points of German executives** are analyzed. While neoclassical economists assume that human beings as homines oeconomici are solely interested in their own current income, behavioral economists by contrast take a broader view: They postulate the relevance of other monetary benchmarks as reference points. In this section, two possible reference points that are widely discussed in the literature are analyzed. First, behavioral economists argue that employees compare their current wage to last year´s wage. Thereby, they do not want to fall below their most recent level of income. This phenomenon is known as loss aversion. Second, there is some evidence that employees make social comparisons when evaluating their earnings. They look at reference groups like for example their neighbors or their co-workers and compare their own income to that of their peers. One assumption is that employees suffer in particular when they earn less than their counterparts. This is called *social* loss aversion. Within this chapter, a unique dataset will be used to ana-

lyze the empirical relevance of both reference points. The data contains rich information about the income of managers and executives in the German chemical sector as well as several demographic factors and job-specific characteristics. Furthermore, a variable for individual job satisfaction is available which serves as a proxy measure of utility derived from work. It is assumed that job satisfaction is affected in cases where the wage deviates from these reference points. Managers can be tracked over time so that current wages and wages from previous years can be matched individually. Moreover, the effects with respect to total compensation, fixed salaries, and bonus payments are analyzed separately. The structure of the dataset makes it possible to differentiate between comparisons with co-workers and with managers from other firms. The research in this chapter is a contribution to the rather scarce literature with respect to remuneration of executives below the top management level.

Finally, chapter 5 summarizes the results.

2 Determinants of Further Training – Evidence for Germany[1]

2.1 Introduction

Due to the increasing worldwide competition among firms it is necessary especially for firms in economically developed countries to have productive employees. In addition, occupational relevant knowledge (human capital) is also important from an individual perspective in order to enhance present and future employability. General knowledge acquired in school or university may not be sufficient for most employment relationships, but has to be complemented by additional knowledge and abilities for the specific job. Besides, knowledge previously learnt may obsolesce especially in dynamic markets with a lot of product and procedural innovations so that the use of further (or continuous) training[2] in firms may be reasonable in order to refresh and adjust employees' human capital. Combined with the problem of aging workforces, further training seems to be a necessity for both employees and firms to survive in the market. Therefore, many firms actually offer some kind of informal or formal further training to their employees.

As competition has increased during ongoing globalization, we may expect to observe growing participation in training over the last decades. In this contribution, the German case is in focus. The training situation in Germany is somewhat special compared to other countries as there is an extensive apprenticeship at the beginning of many jobs (see chapter 2.6). However, the employer association and trade unions agree that further training is a key to competitiveness and employability (Confederation of German Employers, 2007; Confederation of German Trade Unions, 2009). This is in line with the European Commission stating that "skills matter. (…) They are the best insurance against unemployment (…) [and] are a major component of the [European] Union´s productivity, competitiveness and innovation" (European Communities, 2009, p. 2).

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[1] This chapter is based on joint work with Christian Grund and will be published in a shorter version in the International Journal of Human Resource Management (Grund & Martin, 2012). The valuable remarks of one anonymous referee are gratefully acknowledged.

[2] In this chapter, the terms "further training", "continuous training", "vocational training", "occupational training" and simply "training" are used in a widely synonymous way.

However, further training is most probably not equally reasonable for all groups of employees and firms. One can interpret further training as a form of investment, because there are also costs that emerge in terms of direct costs for the training course or opportunity costs of time when visiting this course. These costs have to be amortized by possible benefits afterwards. The main aim of training is to adapt the skills and/or the knowledge to the specific needs of a job. It can be given in formal courses or in informal forms such as mutual learning on-the-job, whereas the focus is on formal training in this chapter. The outcome of training may rather have the character of general or firm-specific human capital. One may expect that there are significant differences about the amount of these benefits between different groups of employees. This should result in different rates of training participation for different groups. Hence, the aim of this study is to empirically analyze possible individual and job-based determinants that affect the decision if a worker receives further training. Consequences of further training are not in scope of this chapter, but the strand of that literature is mentioned in section 2.3 below.

This chapter makes several contributions to the existing training literature regarding the German case: *First*, the analysis is extended from 1984 to the year 2008 so that for the first time developments over two whole decades can be observed. Thereby, an increasing fraction of employees who are involved in further training is observed. The multivariate analysis allows for separating that finding into two effects: On the one hand, there is a general trend towards more further training in the German economy. On the other hand, German workforce altered towards those characteristics which favor the participation in training. *Second*, in contrast to prior studies, panel estimations are applied so that possible unobserved heterogeneity can be controlled for. *Third*, East Germans after reunification are included in the analysis. Doing so, the transformation process with respect to formal training can be explored. *Fourth*, participation rates are supposed to be more intuitive on a yearly base, while previous studies use rates in a three year period by the majority. *Fifth*, investments in general and firm-specific training are analyzed separately. However, there are no considerable differences in terms of their determinants. This finding can be seen as a confirmation of the skill-weights approach of Lazear (2009). *Sixth*, arguments that can be found in the literature with respect to training decisions are assigned to the specific German situation to derive hypotheses for several individual and job-based characteristics of participation in formal training.

The remainder of this chapter is structured as follows: section 2.2 gives an overview of the existing literature on this topic. Hypotheses for individual and job-based characteristics of further training are derived in chapter 2.3. The data and variables are presented in section 0 followed by the outline of the results in section 2.5. Subsequently, the results are discussed in chapter 0, followed by some concluding remarks in 2.7.

2.2 Literature Review

This is not the first work on this topic. There are several other contributions that analyzed the question what factors determine the participation in further training. As the training system in Germany differs profoundly from systems in other countries (see Beck, Kabst & Walgenbach (2009) and chapter 2.7), the review of the existing literature is divided into international and German evidence.

2.2.1 International Evidence

One of the first contributions with regard to the determinants of further training is Altonji & Spletzer (1991). They use the wave 1986 of the US National Longitudinal Survey of the High School Class of 1972 (NLSHS72), which is a representative sample of people who were high school seniors in the academic year of 1971-72. They restrict their sample to those employees who worked more than 1,040 hours and earned up to $75 per hour in their current or last job. To assess the training participation of the workers, they construct a binary indicator which adopts “1” if the employee took part in further training at least once in the current job or in the last job (in case of current unemployment). Doing so, they observe a participation rate of 45.6 percent. However, they have no information when training measures occurred. They run two different regressions in their cross-sectional multivariate analysis assessing the determinants both of the probability of training participation (probit model) and of the hours in training measures (OLS model). They find that women have a higher probability of being trained, but receive fewer hours than male employees. Surprisingly, they detect a slightly higher incidence of training among black workers which they justify with the selection of their sample. Finally, there is a strong positive correlation between training and previous schooling. However, as they can only observe cross-sectional data, the sequence of events remains unclear: Are the investigated independent variables really determinants of training, or just correlates, or even consequences of further training?

Another contribution with evidence for the US is the contribution by Frazis, Gittleman & Joyce (2000) that make use of the 1995 Survey of Employer-Provided Training (SEPT95). This cross-sectional sample contains information of 1,433 establishments that were randomly selected out of all establishments with more than 50 employees. In addition, two employees in every of the drawn establishments were interviewed. 92.5 percent of the observed establishments provided training within the last 12 months before the interview. The participation rate among the employees was 69.8 percent. The authors state that both numbers were rather high compared to other studies. In their multivariate analysis, they also find a strong positive association of schooling both with training incidence and intensity. Moreover, they find that firm size acts rather indirect: Innovative workplace practices like employee involvement in the firm´s technology and equipment decisions, job rotation or the granting of fringe benefits which are more frequent in bigger firms are significantly correlated with training. Male employees are more likely to be trained while the probability is inversely u-shaped in age. The presence of a union within the enterprise decreases the probability of further training which they explain by better apprenticeship programs in unionized firms which leads to a smaller necessity of training. However, the causality is unclear due to the cross-sectional analysis.

In addition, several papers (Arulampalam, Booth & Bryan, 2004; Bassanini, Booth, Brunello, Paola & Leuven, 2005; Albert, García-Serrano & Hernanz, 2010) analyze the European Community Household Panel (ECHP). This longitudinal survey was conducted from 1994 until 2001 within several EU countries. It contains a variety of information about the life and working situation of households and individuals in Europe. Among others, the questionnaire includes questions about further training. The harmonized structure of questions across the countries allows thereby for revealing possible cross-country differences. However, the comparison of training participation rates across different countries is rather difficult due to different institutional frameworks or macroeconomic conditions (see Albert, García-Serrano & Hernanz (2010) for a discussion). The highest participation rates can be observed in northern European countries like Denmark, Sweden, and Norway as well as in Great Britain. In these countries, more than 40 percent of all employees participated in at least one training course during the year before the survey. In contrast to that, southern European countries like Greece or Portugal denote annual training rates of only around 10 percent. Considering the determinants of individual training participation, these studies can use the advantage of panel data which makes it possible to estimate effects rather than correlations. Overall, the authors find a strong and positive influence of both previous education and the skill requirements on a cer-

tain job in all countries. Individual age, part-time employment and fixed-term employment lower the training probability. Employees in bigger firms receive significantly more training. There is no robust effect of gender across European countries.

2.2.2 Evidence for the German Labor Market

Regarding the German case, there is a lot of purely descriptive evidence. In this context, Bellmann (2003) offers a good overview of the available data sources as well as over the descriptive investigations. Nevertheless, there are also some multivariate analyses. Hubert & Wolf (2007) make use of wave 2003 of the German Mikrozensus, which is a randomly selected sample of one percent of all German inhabitants and part of the Labour Force Survey of the EU. The sample is restricted to workers that are not apprentices, in military service, or civilian servants. They find that 14.7 percent of German workers participated in at least one training measure within the year before the interview. Their multivariate logit model with the dependent variable "participation in training yes/no" reveals no significant difference between men and women. Moreover, employees older than 45 years denote considerable lower training rates. This is also true for foreigners. Previous schooling, job requirements, and firm size are positively correlated with the training incidence. Part-time employment is connected with a lower training probability. Leber & Möller (2008) analyzes data of wave 2004 of the Mikrozensus and confirm these results in general.

Besides the Mikrozensus, some studies use data of the German Socio-Economic Panel (GSOEP), which is also used in this contribution.[3] Behringer (1999) explores the training situation in Germany maybe in the most profound way. She thereby uses cross-sectional data of wave 1993 and restricts her sample to German employees from West-Germany. 22 percent report an attendance in further training within three years before the interview (which is the way participants of the GSOEP are asked about their training situation). The results of a binary logit model show that the training probability decreases in age. It is positively connected with the amount of previous schooling, the hierarchical level, and the firm size. Pischke (2001) and Büchel & Pannenberg (2004) confirm her findings by using cross-sectional data from other GSOEP waves (the wave of 1989 and the wave of 2000, respectively) and by applying similar methods to investigate possible correlates.

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[3] See chapter 2.4.1 for a detailed description.

To the best of knowledge, only two studies use data of more than one GSOEP wave. However, none of these makes use of panel estimations. Pannenberg (1998) analyzes the relevance of training for West German employees during the time span 1986 to 1993 based on the GSOEP waves of 1989 and 1993. He finds that 38.2 percent of employees participated in formal training at least once in this time span. In order to explore possible determinants, he applies a negative binomial hurdle model. In contrast to other studies, men are more likely to participate in training. In line with other studies, training participation is positively correlated with previous schooling and firm size.

Finally, Georgellis & Lange (2007) use data of three GSOEP waves (1989, 1993, 2000). Although their contribution is more focused on effects of further training with respect to job satisfaction, they also investigate possible determinants. Their sample is thereby restricted to workers in full-time employment in the public or private sector. On average, 28 percent of the participants assessed at least one course within the three year period prior to the interview. In their multivariate analysis, they pool the data of the three waves and apply a simple cross-sectional binary logit model. The results are in line with other studies as they find an inversely u-shaped correlation of training with age and higher training rates of German employees. Furthermore, their analyses reveal a positive correlation of training with the degree of job responsibility and firm size. They do not control for schooling, though.

Overall, the results are quite similar. Previous schooling, firm size, and job responsibility seem to foster the participation in further training most. However, to the best of knowledge, none of the studies use panel methods in order to capture unobserved heterogeneity which is supposed to strengthen the results. Before own results will be presented in subchapter 2.5, the following subchapter 2.3 provides a short theoretical framework of the decision on training. Moreover, explicit hypotheses about possible determinants will be elaborated.

2.3 Theoretical Considerations and Hypotheses

The decision process about the participation of employees in further training is supposed to extend over two stages. First, the question will arise whether and to which workers training should be offered. Thereby, employers have to weigh the benefits against the costs, compared to a situation without training. Possible benefits include an increased productivity (Zwick, 2005), the screening of newly hired employees (Autor, 2001), or the enhancement of organizational commitment (Bartlett, 2001). On the other hand, there are also costs that emerge

when firms offer training measures to their employees, for example in terms of hiring a course instructor or of continuing wage payments during the training course. These costs considerably vary between different forms of training (Zwick, 2005, p. 161). Firms will offer the possibility of attending a training course to their employees if the expected costs will be amortized by the expected revenues. In the subsequent sections, it will be argued that these cost-benefit relations depend on several individual and job-based characteristics.

Second, employees have to decide whether they should participate in training or not. Similar to the decision of the firms, employees will also weigh the costs and benefits of the training measurement and they will only participate in training if the expected benefits are higher. The participation in training can generate different advantages for the employee: Albert, García-Serrano & Hernanz (2010), Frazis & Loewenstein (2003), Pischke (2001), and Wolter & Schiener (2009) show that in most cases further training leads to considerable wage effects. Moreover, Frazis & Loewenstein (2003) and Pfeifer, Janssen, Yang & Backes-Gellner (2011) present evidence that further training increases the probability of career advancements in terms of promotions. Besides these objectively measurable advantages, Barrett & O'Connell (2001) argue that employees could appreciate the granting of training due to its usefulness in other firms.

On the other hand, workers could face costs in terms of reduced wage payments during the training measures or additional working time if the course is in his spare time. Employees will compare these costs to the expected benefits to make their decisions. However, as the bigger parts of the costs are usually paid by the employer (Loewenstein & Spletzer, 1998; Bassanini, Booth, Brunello, Paola & Leuven, 2005, pp. 56-60; Kuckulenz, 2007, pp. 20-25), we can assume that the more relevant decision takes place on the previous stage by the firm.

Zwick (2005) shows that formal training programs are more costly than informal forms of further training. The focus in the empirical investigation is therefore on formal training programs for employees. In the following two sub-chapters, it is argued that the provision of further training may differ across subgroups of employees and jobs.

2.3.1 Individual Characteristics

First, possible individual characteristics of participation in further training are considered. Employees' **age** may be relevant due to several reasons. A main result of human capital theo-

ry is that investments are sensible rather for young employees because of a larger scope for amortization (Becker, 1962). Therefore, we usually should not observe further training for the elderly. On the other hand, there may be no need for formal trainings for young employees who just completed their apprenticeship or graduated from university, when age acts as a proxy for labor market experience. Therefore, medium aged employees may have higher training probabilities than younger ones, because they have to update occupational knowledge and skills. Besides these arguments from the firm´s perspective, Zwick (2011) presents evidence that also the older employees could abstain from participating in further training. He finds that the elderly prefer rather informal training measures, but firms do not supply these training forms to a sufficient extent to the older employees. Overall, it is therefore concluded:

Hypothesis 1 (Age):

Participation in further training is inversely u-shaped in age.

Direct discrimination is forbidden in European labor markets. However, Auer & Cazes (2002) state that **women** have shorter periods of realized tenure in Germany (and also in most of the other industrialized countries). Hence, some kind of statistical discrimination may still be relevant if firms expect that female employees will stay for a shorter time within the firm than their male colleagues. If this is true, we can argue that employers are less willing to provide formal training programs for women, because of a lower probability that investments amortize. If employees have to bear the training costs, the same argument holds. Women will rather forbear from investments in further training. This leads to

Hypothesis 2 (Sex):

Women have lower probabilities of training participation than men.

The case of **foreign employees** is supposed to be similar to that of women. Differences for foreigners compared to natives with respect to wages and promotions are widely discussed in the literature (see e. g. Constant & Massey (2005) for an investigation of earnings of guest-workers in Germany). Therefore, there should also be evidence for an unequal treatment by

the employers with respect to decisions on training participation. Second, employers may expect that average tenure is shorter for foreign employees because they do not have social and/or cultural roots in Germany and that they return to their home country after some years. Then, the training rate should be lower for foreign people. Finally, participation in courses taught in German may sometimes be hindered by language problems of foreigners. For sure foreigners will in particular benefit from German language courses. However, these courses are not supposed to balance the former arguments. It is therefore stated:

Hypothesis 3 (Foreigners):

Foreigners are less involved in further training.

The relation between employees' **schooling** and participation in further training is less straightforward. On the one hand, it can be easier for more capable persons to benefit from both general education and further training. In this context, further training may be a complement to previous human capital investments such as schooling. Better educated employees are more efficient in learning so that further training is rather beneficial for them (Mincer, 1992, p. 18). The latter argument is enhanced, if certain schooling degrees act as trustworthy signals for motivation in the sense of Spence (1973) with respect to educational investments. Hence, the chance that training costs will be amortized by revenues of an increased productivity would be higher.

On the other hand, further training may also act as a substitute to schooling. Employees without certain knowledge from school such as foreign languages may catch up things in formal training programs. Decreasing marginal benefits may be another argument for firms rather to provide further training for less educated employees. Most authors do not particularly pay attention to this substitution effect – most probably because they do not expect considerable relevance.

Therefore, it is formulated:

Hypothesis 4 (Schooling):

Better educated employees get more further training.

2.3.2 Job- and Firm-based Characteristics

Next to individual factors, job- and firm-based characteristics can also be relevant for the training decision. First, **tenure** is supposed to be a relevant characteristic. Note that now *actual* tenure is focused in contrast to *expected* tenure for the arguments concerning sex and foreigners above. Employees may face formal internal trainings directly after recruitment in order to learn firm-specific tools and processes or to get involved into the specific corporate culture. After these initial courses, the probability of training should then diminish. Further training can become relevant again for those employees with higher tenure to be updated on procedural or product innovations in the firm. This leads to

Hypothesis 5 (Tenure):

Participation in further training is u-shaped in tenure.

This argument is quite different compared to what has been argued above with respect to age: Here, the focus is on new intra-firm tools and processes that require further training and not on innovations in the occupational environment concentrating on the individual age (as a proxy for labor market experience). For example, an accountant has to learn new legal rules (occupational environment) and also has to familiarize himself with the new company IT system (intra-firm environment).

The contracts for some employees are limited to a certain period of time**. Limited work contracts** can have several functions: For example, they can be used to enhance workforce flexibility since firms do not face any direct separation costs like severance payments when terminating limited contracts. Furthermore, they may act as a solution for the adverse-selection

problem resulting from asymmetric information in the labor market (Akerlof, 1970), as they are similar to a probation time whilst the employer can observe the abilities of the employee. Even if there is the possibility that the contract becomes renewed, the expected duration of the employment relationship is shorter in a situation with a limited contract, compared to one with an unlimited contract. In consequence, an amortization is less likely. This leads to

Hypothesis 6 (Limited work contract):

The probability of being trained is lower for people with a limited work contract.

Additionally, further training shall be more relevant for certain **jobs**. Employees with responsible jobs and comprehensive tasks face a variety of necessary skills. The larger the complexity of necessary skills is, the higher is the probability that some skills or knowledge has to be accumulated by formal trainings. For instance, a simple member of a work team, who becomes promoted to the position of team leader, has to acquire certain skills of managing a team. These skills may include handling intra-team conflicts in an effective way or setting the right incentives to work, for instance. In this context, Beck, Kabst & Walgenbach (2009) argue that education in school or at the university cannot teach these very specific skills as they are rather unstandardized and depend on the unique situation in a firm. Hence, it is likely that these competences are taught in formal courses. Another possible explanation is as follows: Ceteris paribus firms promote employees which are more productive than others. Hence, a higher hierarchical level could stand for a higher individual productivity of the employee. This productivity could depend on individual characteristics like schooling or age, but also on the individual motivation of the employee (that cannot be directly observed in the data). If this is true, we can assume that employees on higher levels are on average higher motivated and more productive. From the firm perspective it is better to provide training courses to relatively motivated employees because of the expected better amortization of investments.

It is therefore stated:

Hypothesis 7 (Job status):

Participation in further training increases in the level of job responsibility.

Formal training is supposed to be more relevant in **large firms** due to several reasons. First, the fix costs of training arrangements can be distributed on more employees, which lead to economies of scale (Haber, 1991). Second, it is likely that larger firms have better opportunities to re-allocate tasks, if certain employees are absent due to training participation (Pannenberg, 1995, p. 54). Third, larger firms are more likely to implement internal labor markets (Doeringer & Piore, 1971), which lead to longer expected tenure periods and less risky training investments (Holtmann & Idson, 1991). This leads to:

Hypothesis 8 (Firm size):

Employees of large firms get more further training than those of small firms.

The expected benefit of formal training arrangements may also increase in the **weekly working time** of the employee. The firm benefits especially from the increased individual productivity, if the trained employee works many hours (Behringer, 1999, p. 39).[4] Besides, one might interpret a longer working time as a proxy for a higher commitment to the firm which is also in favor of investing in these employees rather than in employees with fewer working hours.

[4] Note that full-time employees as well as part-time employees from different hierarchical levels are investigated so that there is some variation within the sample with respect to working time.

It is therefore concluded:

Hypothesis 9 (Working time):

Participation in further training increases with actual working hours.

2.3.3 Historical and Contemporary Background

Finally, the general economic situation may have had influenced training decisions. Competition among firms increased **over the last decades** due to ongoing globalization. If (minimum) wages are fixed by collective agreements or guaranteed benefits of the welfare state in case of unemployment like in Germany and worldwide competition becomes harder, firms are forced to maintain or increase employees' productivity. Further training might be an appropriate opportunity. This leads to

Hypothesis 10 (Time):

Participation in further training increased over time.

The German case is most likely be influenced by reunification in 1990. The transformation process in **East Germany** at the beginning of the 1990s led to a necessary adaption to the market economy. Therefore, employees had to learn corresponding knowledge and skills on short notice so that the last conjecture is

Hypothesis 11 (Region):

East German employees face extraordinary high rates of further training directly after reunification.

Table 2.1 shows a short summary of all hypotheses. In the following, the dataset and the methodology for analyzing the participation in further training in Germany will be described.

Table 2.1: Summary of hypotheses

Individual characteristics:	
Age	inversely u-shaped
Female	(–)
Foreigner	(–)
Years of schooling	(+)
Job- and firm-based characteristics:	
Tenure	u-shaped
Limited work contract	(–)
Job status (Level of job responsibility)	(+)
Firm size	(+)
Working time	(+)
Historical and contemporary background	
Year of observation	(+)
East Germany	(+) (especially in 1993)

2.4 Data, Variables, and Methodology

2.4.1 Dataset

In order to test these hypotheses, data of the German Socio-Economic Panel (GSOEP) are used. The GSOEP is a representative dataset of people living in Germany. Individuals are asked on an annual base from 1984 on about several areas of life including general attitudes and their employment relationship next to usual demographics. One main advantage of the GSOEP is its panel character. Hence, the life and working situation of individuals can be

tracked over the years. Moreover, the GSOEP team conducts regular refreshments and enhancements of their sample so that normal panel attrition can be worked against. In consequence, we can assume that the GSOEP data are representative for the whole population of Germany from 1984 on.[5]

Most of the questions within the GSOEP are asked annually. Besides, the questionnaire also includes some batteries of questions to special topics that are not asked yearly, but in irregular intervals. Detailed questions on further training are asked in the years 1989, 1993, 2000, 2004, and 2008. Individuals are asked whether they participated in further training within a three year period before the interview. If they did so, participants should answer several questions about the three courses they attended lastly, for example about the date and the duration of the course. Combined with the information about the date of the interview, it is possible to compute a binary variable "participated in further training" with "1=yes" if the employee has attended at least one course in the 12 month prior to the interview and "0=no" if not. This variable acts as the dependent variable of the multivariate analysis. This approach facilitates to speak of "yearly further training rates" of subgroups. Some previous studies (Pannenberg, 1995; Behringer, 1999; Pischke, 2001; Büchel & Pannenberg, 2004; Georgellis & Lange, 2007) have used an alternative approach. In GSOEP, respondents are also asked: "How many courses for further professional education have you attended in the last three years?" In these studies, employees denote a training participation if they state a number higher than zero with respect to this question. However, employees should be better able to review the one year period and it is hoped to get more valid results.

The sample is restricted to full- and part-time employees aged between 20 and 65 (the regular retirement age). Trainees and apprentices are excluded. Firms in public sector are much less constrained by the need of being profitable (Booth, 1991). Hence, it may be assumed that training decisions in the public sector may not base on economic considerations in some cases. Therefore, civil servants and employees from the public sector are also excluded from the analysis as further training in the private sector shall be investigated. The dataset consists of 18,375 observations from 10,363 different persons and is hence an unbalanced panel (1989: n = 2,502; 1993: n = 3,693; 2000: n = 3,332; 2004: n = 4,492, 2008: n = 4,356). Dif-

[5] The data are provided by the German Institute of Economic Research (DIW, Berlin). For a detailed description see http://www.diw.de/en/soep.

ferences in sample sizes across years can be explained by the integration of East Germans from the year 1991 onwards, some panel refreshments and general panel mortality.

In order to test the hypotheses, several variables of the GSOEP are used. Since the characteristics that account for participating in training in year t should be found, the information of the individual and job-based characteristics of year t-1 (which is possible due to the panel structure of the GSOEP) are used. Thus, it is assured to use the information from before the training measurement, since only courses in the one year period are observed.

Furthermore, information for individuals' age, sex, schooling and the observation year are available. It is distinguished between German and foreign employees. With respect to the considerations on job- and firm-based characteristics, data on the individual tenure (in years), job status (seven categories of blue-collar and white-collar jobs differing in the responsibility of tasks), actual working time (hours per week) and the temporally limitation of the work contract (dummy) may be used. Firm size is measured with the number of employees of the firm in which the respondent works (four categories). It is also controlled for industries (six categories). Analyzing the historical and contemporary background, year dummies and information on the region people live in (East Germany vs. West Germany) are taken into consideration.[6]

In Table 2.2 some descriptive statistics about the dataset are provided. It is distinguished between years in order to show some developments over time. GSOEP weighting variables as suggested by Frick, Haisken-DeNew, Spiess & Wagner (2005) are used so that the dataset is continuously representative for the German workforce.

Apparently, employees become older over the observed period. Besides, the fraction of women and the average amount of years of schooling increase. The structural change from the secondary to the tertiary sector is captured by the decreasing fraction of blue-collar workers in the sample. The average tenure decreases from 10.5 years in 1989 down to 10.1 years in 2000, but increases again up to 10.5 years in 2008. Correspondingly, the fraction of employees with a temporally limited work contract rises from 3.4 percent in 1989 up to 4.9 percent in 2000 and falls again to 2.9 percent in 2008. The distribution with respect to firm size shows off a

[6] A detailed description of the operationalization of all variables is offered in Table A 1 in the appendix.

smooth shift to smaller firms. On average, formal education of employees becomes higher as the average years of schooling increases from 11.2 in 1989 to 12.1 in 2008.

Table 2.2: Descriptive statistics

		1989	1993	2000	2004	2008	Total
Participation in further training		0.165	0.181	0.201	0.198	0.235	**0.197**
Age	Mean	38.6	39.6	40.8	41.3	41.6	**40.4**
	Stand. deviation	11.2	10.3	10.1	10.4	10.5	**10.3**
Female		0.342	0.352	0.36	0.391	0.401	**0.370**
Foreigner		0.092	0.104	0.087	0.074	0.076	**0.087**
Residence in East Germany		0.000	0.170	0.176	0.169	0.177	**0.145**
Years of schooling							
0-10.5 years		0.548	0.498	0.407	0.370	0.339	**0.430**
11-14.5 years		0.359	0.405	0.460	0.487	0.504	**0.445**
15-18 years		0.093	0.097	0.133	0.143	0.158	**0.125**
	Mean	11.2	11.4	11.8	11.9	12.1	**11.7**
	Stand. deviation	2.2	2.2	2.4	2.3	2.4	**2.3**
Job status							
Untrained blue-collar worker		0.040	0.037	0.023	0.023	0.042	**0.033**
Semi-trained blue-collar worker		0.163	0.145	0.140	0.144	0.135	**0.145**
Trained blue-collar worker		0.228	0.241	0.206	0.207	0.196	**0.216**
Foreman, team leader		0.065	0.074	0.064	0.056	0.056	**0.063**
White-collar worker with simple tasks		0.096	0.118	0.119	0.129	0.136	**0.121**
Qualified professional		0.273	0.230	0.259	0.274	0.261	**0.258**
Highly qual. prof. or man. position		0.135	0.155	0.189	0.166	0.175	**0.165**
Tenure							
Tenure	Mean	10.5	10.3	10.1	10.4	10.5	**10.3**
	Stand. deviation	9.5	9.5	9.6	9.5	9.3	**9.3**
Limited work contract		0.034	0.020	0.049	0.045	0.029	**0.035**
Weekly working time							
≤ 30 hours (part-time)		0.134	0.109	0.129	0.151	0.151	**0.134**
> 30 hours (full-time)		0.866	0.891	0.871	0.849	0.849	**0.866**
Firm size							
Up to 19 employees		0.228	0.231	0.261	0.260	0.254	**0.247**
20-199 employees		0.296	0.292	0.312	0.328	0.314	**0.308**
200-1999 employees		0.239	0.252	0.215	0.211	0.217	**0.227**
At least 2000 employees		0.237	0.225	0.212	0.202	0.216	**0.218**
Industry							
Agriculture		0.014	0.029	0.025	0.017	0.014	**0.020**
Manufacturing		0.550	0.490	0.430	0.405	0.407	**0.454**
Construction		0.103	0.119	0.083	0.079	0.070	**0.091**
Retail/Tourism/Transportation		0.164	0.215	0.237	0.247	0.233	**0.221**
Financial/Corporate Services		0.102	0.084	0.106	0.124	0.145	**0.112**
Public and Private Services		0.067	0.063	0.120	0.127	0.131	**0.102**
Observations		**2,502**	**3,693**	**3,332**	**4,491**	**4,356**	**18,375**

Note: The results are calculated with cross-sectional weights.

2.4.2 Methodological Approach

Starting with the analysis, some descriptive statistics are conducted in order to compare further training rates between different subgroups and between the observed years. Furthermore, a binary probit approach with the dummy "Further training" as the dependent variable (1="yes", 0="no") is applied. The arguments in section 2.3 suggest that several individual (*x*) and job-based (*y*) characteristics and the contemporary background (*z*) may affect the participation in further training so that

$$\text{Further Training} = \alpha + \mathrm{x}'\beta + \mathrm{y}'\delta + \mathrm{z}'\chi + \varepsilon \qquad (2.1)$$

describes the empirical model. The effect of the independent variables on the probability of participation in further training is indicated by the corresponding regression coefficients β, δ, and χ, whereas α represents the intercept.

To begin with the multivariate analysis, the pooled dataset including all observations from 1989 until 2008 is analyzed. Thereby, a random-effects model is applied for two reasons. First, the impact of time-invariant determinants like sex or nationality should be analyzed. This would not be possible by using a fixed-effects model because they would bedropped out by the within transformation (see chapter 3.4.3 for a detailed description of the fixed-effects estimator). Second, the dataset has an unbalanced structure with many employees with observations in only one year. These observations would not be taken into account in a binary fixed-effects model (Wooldridge, 2002, p. 580).[7] Subsequently, single years´ data are analyzed by applying cross section binary probit models.

[7] It is not useful to estimate binary probit fixed-effects models because of inconsistent results (Cameron & Trivedi, 2009, p. 601). Therefore, the results of a binary logit fixed-effects model and a binary logit random-effects model had been tested against each other. For those persons with information in multiple years and variation in the dependent variable (4,002 observations of 1,378 persons), the result of the Hausman test is not significant, which indicates that a random-effects model is more efficient compared to a fixed-effects model. In this contribution, binary probit estimations are chosen. However, the qualitative results do not differ to corresponding logit estimations at all (see Table A 2 and Table A 3 in the appendix for the respective models).

2.5 Results

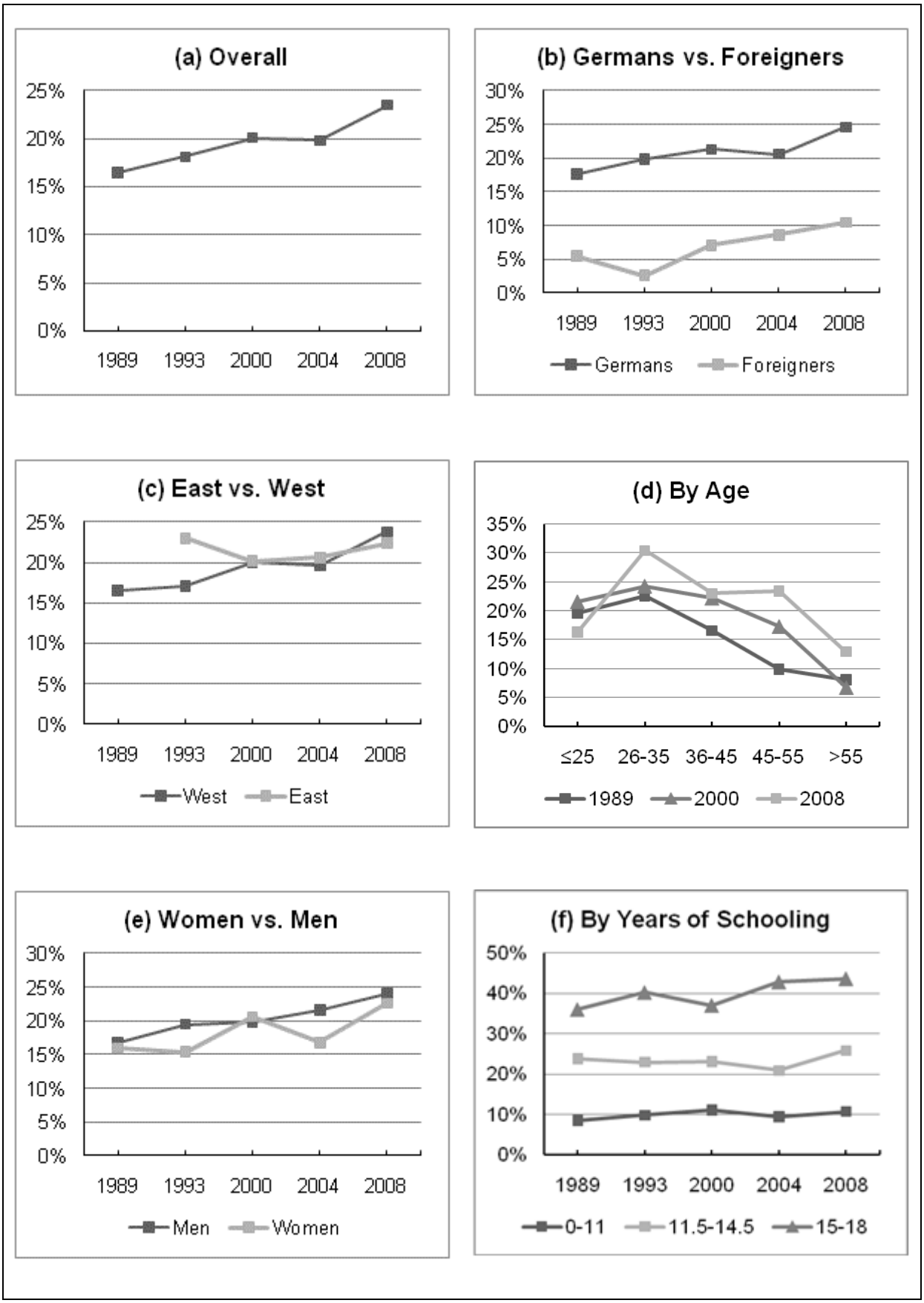
2.5.1 Descriptive Statistics

Figure 2.1 and Figure 2.2 indicate a first impression of yearly training rates of employees. There is an upward trend in the incidence of formal training (Figure 2.1a). Whereas 16.5 percent of employees have been trained in 1989, the fraction has increased to 23.5 percent in 2008. As one can see from Figure 2.1b, foreigners have considerable lower rates of training than German employees in all five years. Training rates directly after the German reunification in 1990 are somewhat higher in East Germany, which is in line with the prediction. In the subsequent years, East and West German employees have a nearly identical probability of being trained (Figure 2.1c).

Figure 2.1d illustrates the predicted inversely u-shaped relation between age and training participation for certain years, which is in accordance with the conjecture. Training rates do not differ considerably between male and female employees. In contrast, employees face different training rates with respect to education. Rates for individuals with at least 15 years of schooling (university graduates) are about 16 percentage points higher as for employees with 11.5 up to 14.5 years and even on average 30 percentage points higher as for individuals with at most 11 years of schooling.

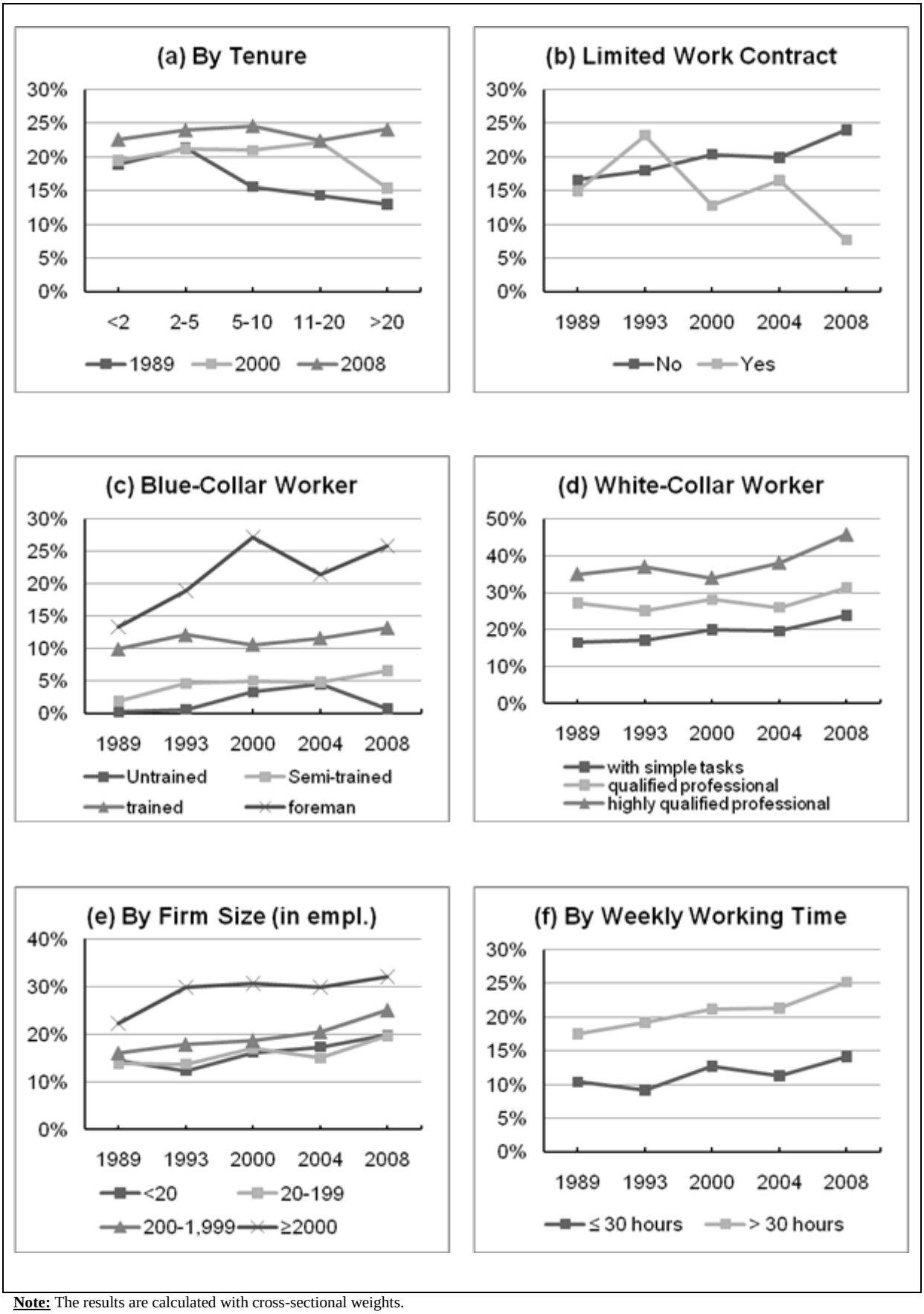
Participation rates in further training with respect to different job- and firm-based characteristics are presented in Figure 2.2. First, there is a slight inversely u-shaped curve for tenure in 1989. In later years, this picture disappears and the training rates are nearly stable over all tenure groups (Figure 2.2a). A limited work contract seems to have no clear link with participation in further training. At most, lower training rates for individuals with a limited work contract can be observed in the year 2008 (Figure 2.2b). Figure 2.2c and Figure 2.2d show training rates for different groups of blue-collar and white-collar workers. Training rates increase in the job responsibility. It is also evident that white-collar worker have on average higher training rates than blue-collar workers. When looking at different firm size categories (Figure 2.2e), no considerable differences in training rates between the smallest size (<20 employees) and the second smallest group (20-199 employees) can be shown. However, people in bigger firms have higher rates.

Figure 2.1: Training rates over time (individual characteristics and historical background)



Note: The results are calculated with cross-sectional weights.

Figure 2.2: Training rates over time (job- and firm-based characteristics)



Note: The results are calculated with cross-sectional weights.

Another interesting point is that the development over time suggests a slight convergence of training rates across firm size categories. Last, full-time employees report considerably more often participation in training than individuals in part-time employment relationships (see Figure 2.2f).

To sum up, most of these illustrations are in line with the hypotheses derived above in section 2.3. However, the results of these bivariate illustrations cannot be interpreted as effects as the variables are very likely to be correlated with each other. Therefore, it will be proceeded with a multivariate analysis to test the hypotheses econometrically and to disentangle the different effects.

2.5.2 Multivariate Analysis

The dependent variable is the dummy variable "Further Training" (as explained in chapter 0). First, the results gained from the random-effects probit model are presented.

Most of the hypotheses are supported by the results of the binary probit estimate (see Table 2.3): Participation in further training is significantly lower for females, foreigners and West Germans over the whole observation period on average. Moreover, an inversely u-shaped effect for age with a maximum at 27 years is found. As predicted, the probability of being trained increases in the level of the job responsibility. White-collar workers denote on average more training than blue-collar workers. Years of schooling are positively associated with the probability of training. As expected, there is a u-shaped effect of tenure on further training (minimum at 15 years).[8] Furthermore, there is also a positive effect for the actual working hours per week and a negative effect for a limited work contract. Employees in bigger firms

[8] However, this effect is not very big and not independent from the effect of age since increasing tenure of an individual goes automatically along with an increasing age. A joint consideration of both tenure and age reveals a constantly negative influence on training participation, which means that the age effect overcompensates the effect of tenure in higher years.

face a higher training probability.[9] There is no significant difference between the lowest and the second-lowest firm size category, though. Compared to the manufacturing industry, employees in service sectors receive significantly more and in the construction industry less training. The results with respect to the other characteristics are robust for an estimation with more detailed industry categories. The hypothesis with respect to the general trend over time is mainly supported. Training probability has increased significantly from 1989 to 2000 and from 2000 to 2008. However, there is no significant increase from 1993 to 2000 and again from 2000 to 2004. A joint test for the set of year dummies reveals a high significance, though.

To evaluate the economic significance, one may have a look at the marginal effects at the second column. They are computed at the mean of the other independent variables. Hence, a certain marginal effect indicates the change in the probability of being trained when the independent variable increases by one unit, given average outcomes in all other independent variables. The most pronounced relations to training participation are found for being a foreigner, job status and firm size. Training participation rates are seven percentage points lower for foreigners than for Germans, 17 points larger for highly qualified white-collars than for unskilled blue-collar workers and nine points higher in large firms with at least 2,000 employees than in small firms with less than 20 employees. The estimated differences in participation rates between the years of observation are considerably smaller than those in the descriptive statistics. Hence, the increase in training participation traces back to two different sources: First, German employees altered towards those characteristics which favor the participation in training like for example a longer previous education. But when it is controlled for this in the estimation, there is still a significant trend of increasing training participation left. This might be a general response of firms to globalization and shorter product life cycles.

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[9] There are some hints that the firm size effect is partly driven by the existence of works councils in the establishment. These are more likely in bigger firms due to legal regulations in Germany. Some contributions show a positive influence of works councils on further training in firms (Bellmann & Ellguth, 2006; Lehmann, 2011). Unfortunately, the GSOEP offers information on the existence of a works council only in the waves of 2001 and 2006. One can, however, match the works councils variable of 2006 to the information on participation in further training in 2008 and then control for the existence of a works council. Doing so, the marginal effects with respect to firm size shrink down slightly. The significances, though, remain in a rather similar dimension. The coefficient of the works council dummy in this cross-sectional analysis has a significance level of 11 percent.

Table 2.3: Determinants of further training (pooled)

	Random-effects binary probit Participation in training (1=yes)	Marginal effects
Age	0.038*** (0.012)	0.007
Age² x 100	-0.070*** (0.014)	-0.012
Female	-0.151*** (0.040)	-0.026
Foreigner	-0.487*** (0.064)	-0.069
Residence in East Germany	0.127*** (0.039)	0.023
Job status		
Untrained blue-collar worker	-1.325*** (0.163)	-0.105
Semi-trained blue-collar worker	-0.948*** (0.082)	-0.111
Trained blue-collar worker	-0.462*** (0.067)	-0.069
Foreman, team leader	---	---
White-collar worker with simple tasks	-0.202*** (0.078)	-0.032
Qualified professional	0.167** (0.068)	0.031
Highly qualified professional or managerial position	0.338*** (0.072)	0.068
Years of schooling	0.043*** (0.008)	0.008
Tenure (in years)	-0.014*** (0.005)	-0.003
Tenure² x 100	0.046*** (0.015)	0.008
Actual work time per week	0.007*** (0.002)	0.001
Limited work contract	-0.169** (0.081)	-0.027
Firm size		
Up to 19 employees	-0.024 (0.042)	-0.004
20-199 employees	---	---
200-1999 employees	0.217*** (0.042)	0.041
At least 2000 employees	0.404*** (0.042)	0.082
Industry		
Agriculture	-0.019 (0.104)	-0.003
Manufacturing	---	---
Construction	-0.201*** (0.062)	-0.032
Retail/Tourism/Transportation	-0.069 (0.043)	-0.012
Financial/Corporate Services	0.150*** (0.050)	0.028
Public and Private Services	0.370*** (0.052)	0.078
Year		
1989	-0.121** (0.054)	-0.020
1993	0.024 (0.045)	0.004
2000	---	---
2004	0.001 (0.041)	0.000
2008	0.146*** (0.042)	0.027
Intercept	-2.153*** (0.267)	
Observations (persons)	18,375 (10,363)	
McFadden Pseudo-R²	0.12	

Notes: Robust standard errors in parentheses. Marginal effects are calculated at the means of other independent variables.

Table 2.4: Determinants of further training (single years)

	Binary probit (1=yes)				
	(1)	(2)	(3)	(4)	(5)
	1989 (West)	1993	2000	2004	2008
Age	-0.022 (0.032)	0.039 (0.028)	0.008 (0.028)	0.068*** (0.025)	0.027 (0.025)
Age² x 100	-0.0024 (0.041)	-0.072** (0.035)	-0.036 (0.034)	-0.102*** (0.030)	-0.044 (0.030)
Female	-0.132 (0.111)	-0.126 (0.090)	0.043 (0.093)	-0.304*** (0.079)	-0.036 (0.080)
Foreigner	-0.153 (0.179)	-0.667*** (0.150)	-0.394** (0.164)	-0.329** (0.132)	-0.222 (0.159)
Residence in East Germany		0.283*** (0.077)	0.125 (0.088)	0.175** (0.079)	-0.057 (0.081)
Job status					
Untrained blue-collar worker	-1.730*** (0.370)	-1.271*** (0.395)	-1.014*** (0.319)	-0.788*** (0.286)	-1.724*** (0.387)
Semi-trained blue-collar worker	-1.025*** (0.231)	-0.666*** (0.163)	-0.937*** (0.191)	-0.758*** (0.196)	-0.778*** (0.194)
Trained blue-collar worker	-0.348** (0.174)	-0.325** (0.136)	-0.685*** (0.160)	-0.379*** (0.142)	-0.413*** (0.152)
Foreman, team leader	---	---	---	---	---
White-collar worker with simple tasks	-0.267 (0.221)	-0.152 (0.169)	-0.473** (0.198)	-0.110 (0.164)	-0.217 (0.174)
Qualified professional	0.299* (0.175)	0.111 (0.142)	-0.122 (0.162)	0.132 (0.140)	0.061 (0.155)
Highly qualified professional or managerial position	0.519*** (0.189)	0.240 (0.150)	-0.034 (0.176)	0.261* (0.151)	0.233 (0.167)
Years of schooling	0.027 (0.021)	0.058*** (0.019)	0.046** (0.019)	0.042** (0.017)	0.049*** (0.017)
Tenure (in years)	0.007 (0.015)	0.003 (0.011)	0.003 (0.012)	-0.019* (0.010)	0.009 (0.011)
Tenure² x 100	0.023 (0.042)	0.0046 (0.035)	-0.0058 (0.034)	0.056* (0.030)	-0.019 (0.031)
Actual working time per week	0.007* (0.004)	0.008* (0.005)	0.004 (0.004)	0.005 (0.003)	0.012*** (0.004)
Limited work contract	-0.233 (0.245)	0.219 (0.216)	-0.287 (0.190)	-0.220 (0.158)	-0.490** (0.198)
Firm size					
Up to 19 employees	0.047 (0.122)	-0.012 (0.104)	-0.062 (0.099)	0.125 (0.085)	0.023 (0.091)
20-199 employees	---	---	---	---	---
200-1999 employees	0.171 (0.115)	0.169* (0.092)	0.093 (0.108)	0.193** (0.091)	0.147 (0.092)
At least 2000 employees	0.325*** (0.113)	0.533*** (0.094)	0.328*** (0.100)	0.429*** (0.089)	0.248*** (0.088)
Industry					
Agriculture	-0.629 (0.504)	-0.306* (0.158)	0.179 (0.235)	-0.355* (0.194)	-0.066 (0.283)
Manufacturing	---	---	---	---	---
Construction	-0.097 (0.168)	-0.251** (0.109)	-0.351** (0.174)	-0.249** (0.117)	-0.153 (0.131)
Retail/Tourism/Transportation	0.173 (0.122)	0.000 (0.099)	-0.079 (0.104)	-0.117 (0.092)	-0.058 (0.094)
Financial/Corporate Services	0.327** (0.129)	0.291** (0.117)	0.181 (0.119)	0.222** (0.101)	0.065 (0.102)
Public and Private Services	0.250 (0.172)	0.083 (0.141)	0.143 (0.124)	0.333*** (0.097)	0.383*** (0.107)
Intercept	-0.896 (0.684)	-2.424*** (0.618)	-1.072* (0.637)	-2.460*** (0.592)	-2.170*** (0.573)
Observations	2,502	3,693	3,332	4,491	4,356
McFadden Pseudo-R²	0.17	0.16	0.13	0.14	0.13

Notes: Robust standard errors in parentheses. The results are calculated with cross-sectional weights.

The descriptive illustrations give some indications that there are differences with respect to training rates for different subgroups between the single years. Therefore, also the results of binary probit regressions on the base of single years´ datasets are presented (see Table 2.4). A significant inversely u-shaped correlation between age and training is only observable in 2004 (maximum at 33 years). Women denote significant lower training rates than men only in 2004. There is a significant lower probability of being trained for foreigners in 1993, 2000 and 2004. However, the coefficients become smaller over time, which indicates a decreasing importance of being a foreigner for training participation. As predicted, East Germans have a significantly higher training rate directly after the German reunification.

There is a clear link between the level of job responsibility and training probability in all five years. Furthermore, white-collar workers denote continuously higher rates than blue-collar workers. Years of schooling are positively correlated with training from 1993 on. One can see the predicted u-shaped relation between tenure and training probability only in 2004 (with a minimum of 17 years). Working time and training show a significant link in 1989, 2004 and 2008. Only in the year 2008, employees with a limited work contract denote a lower training probability. The evidence for firm size is not as clear as in the random-effects estimation, as there are continuously significant coefficients only for the biggest firm size. However, when looking on the sign of the other coefficients, the predicted positive link between firm size and training reveals. The goodness of fit, measured by the McFadden Pseudo-R^2, decreases over time. Therefore, other (unobserved) determinants become more important.

2.6 Limitations and Discussion

Challenging the results, one may argue that the focus is on training participation and it is abstained from analyzing any kind of training quality or intensity. For this purpose, possible indicators could be the length of the course or the productivity gain due to further training. Some studies like Pischke (2001) or Georgellis & Lange (2007) try to estimate some kind of training intensity by regressing the overall individual duration of training courses on possible determinants (measured in days respectively weeks). However, the explanatory power of these estimations is very low. This could arise from data restrictions as the GSOEP does not provide detailed information if the course was full-time or only some hours per day or week. Furthermore, information about the duration is only available for the last three courses. Nevertheless, an ordered probit models with a comparable specification using the number of

courses within the one year period as the dependent variable has also been estimated. The qualitative results are similar to the binary probit estimates (see Table A 4 in the appendix).

Further training is understood as an investment in human capital. An important strand of the literature on human capital focuses on the distinction between general and firm-specific human capital (see already Becker (1962) in his seminal contribution). According to human capital theory, firms should not invest in general skills of employees as they are completely transferable to other firms and, hence, the training firm has little possibilities to save the earnings of the investment. However, Acemoglu & Pischke (1998) argue that the training firm has superior information with respect to the impact of the training course and the abilities of the employee. Hence, firms have some kind of monopsony power against their workers. In consequence, employers can amortize the costs of further training, even if it provides general knowledge and abilities. Indeed, there is some evidence by Acemoglu & Pischke (1998) or Büchel & Pannenberg (2004) that German companies bear at least part of the costs in most cases. Furthermore, Lazear (2009) argues that all skills are general, but a vector of certain general skills is used in different combinations and with different weights across companies. Therefore, most human capital investments within firms do have a specific character and, hence, also employers have incentives to invest in some mix of general human capital components of their employees.

As the GSOEP provides some information about the specificity of the training course[10] (at least for one course in the years 1993 until 2008), it is possible to estimate a multinomial probit model with a dependent variable with the categories “no training” (base), “rather firm specific training” and “rather general training”. Results are shown in Table A 5 in the appendix and reveal similar relations for both kinds of training. This finding may be a support of Lazear´s argument: Employers expect that they are able to amortize the costs of training even if the skills taught in these courses could be used in other firms. Hence, the decision on training is not about the specificity of the course, but rather about whom to train.

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[10] However, information on the specificity is not available for all courses. In 1993, individuals are asked about the transferability of the gained knowledge in their most important course in the last three years. In 2000, they were asked more generally whether they could use the newly acquired knowledge in other firms. In 2004 and 2008, they were asked about the transferability of the knowledge gained in their three last courses. To make the data from the different years comparable, it has been concentrated on the information of the last course in these two years.

2.7 Concluding Remarks

Based on theoretical considerations, possible characteristics of participation in further training are investigated. Thereby, a period of twenty years from 1989 to 2008 is observed, using representative employee data from Germany. The longitudinal analysis of the whole observation period provided support for most of the hypotheses. Looking on economic relevance by computing marginal effects, being a foreigner, the job status, and the firm size affects the training decisions most. The analyses of five single years´ cross-sectional data from within the 20 year period reveal that these results are rather stable over time.

The results are mostly in line with some previous contributions. In contrast to several other studies, however, there is a negative and significant effect of being a woman on the probability of training participation (see Fitzenberger & Muehler (2011) for a recent discussion of gender differences in training). As mentioned above, it is difficult to compare participation rates in training across different countries. The German case is somewhat special because of the unique system of the dual apprenticeship system (combination of in-firm training and vocational school). In many occupations, workers get a rather standardized and extended apprenticeship at the beginning of their occupational career. In consequence, the need of further vocational training is lower compared to other countries (see Beck, Kabst & Walgenbach (2009) for a discussion of different labor market systems with respect to training). As shown by for example Albert, García-Serrano & Hernanz (2010), training rates in Germany are indeed lower. However, an increasing rate of training participation from 1989 until 2008 can be detected within the German labor market. The estimations reveal two effects which are accountable: First, there is a general development within the German workforce towards training-favoring characteristics like a high education. Second, there is still a significant time trend left. Different explanations for this finding may be suggested: First, increasing competition due to globalization could force firms to increase employee´s productivity to keep their market position. This pressure is supposed to be even bigger in the German labor market, in which collective wage agreements and considerable unemployment benefits build a factual minimum wage. Second, this finding could indicate that the skills and the knowledge which are taught within the German apprenticeship system are less and less sufficient for an entire occupational career. Third, this could be a consequence of the widely discussed demographic trend. Firms could already face actual or anticipate future shortages of skilled young workers at the labor market and therefore intensify their training endeavors.

In order to check for the robustness of the results, it is also differentiated between investments in general and specific human capital. It turns out that the determinants of those two kinds of investments are rather similar. Thus, the distinction between these two kinds of human capital seems to be of minor importance for the decision on further training participation. This finding is interpreted as a confirmation of Lazear´s view that firms use general skills in a specific combination which allows them to invest in general training without the threat that employees leave the firm afterwards.

A shrinking goodness of fit of the model with respect to the determinants of training over time is found, which seems to indicate that other factors become more important. Further research should investigate which other determinants (that are not included in this analysis) has become more relevant in the context of further training.

In this study, the focus is on individual and job-based determinants of further training. Further research may enlarge the focus and include the firm´s decision, whether their employees are trained for new tasks or jobs or new workers are hired to carry out these additional assignments.

3 The Impact on Earnings When Entering the Self-Employment Sector – Evidence for Germany[11]

3.1 Introduction

One of the most important issues regarding the decision on an occupation is the expected monetary compensation. It is also relevant for one´s decision to engage in self-employment[12]. Prior research shows that the probability of becoming self-employed is influenced by the magnitude of the expected earnings difference between an occupation in wage-employment and in self-employment (Johansson, 2000; Fossen, 2007; Hammarstedt, 2009). Though, literature provides empirical evidence that US workers abstain from at least some part of their income gained in wage-employment when they move into self-employment (Hamilton, 2000). There is, however, a lack of research for the German labor market. Older, rather general descriptive data of the OECD suggest that the situation in Germany could be different as median earnings of entrepreneurs are higher than those of employees (OECD, 1992). Moreover, Merz (2004) and Braakmann (2007) show that the self-employed are relatively more present at the top of the income distribution in Germany. There is evidence in a recent contribution of Fritsch, Kritikos & Rusakova (2012) that the majority of workers can increase their income when they switch from wage-employment to self-employment in Germany. However, their results are only descriptive. Hence, the aim of this paper is to investigate thoroughly the income situation for self-employed people in Germany in comparison to wages of employees. The focus is thereby on the impact on earnings when entering self-employment.

There are several difficulties that arise when investigating earnings differences between self-employed and wage-employed people (Parker, 2004, pp. 12-14). *First*, the entrance in self-employment should not be random, but depends on observable and unobservable factors (see

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[11] Valuable comments of the participants of the "Herbstworkshop 2011 der Kommission Personalwesen" in Rauischholzhausen, of the "9. Jahrestagung des Arbeitskreises für Empirische Personal- und Organisationsforschung 2011" in Mülheim an der Ruhr, of the "15th Colloquium on Personnel Economics" in Paderborn, and of the "EURAM Annual Conference 2012" in Rotterdam are gratefully acknowledged. This project will be also presented at the "Academy of Management Annual Meeting 2012" in Boston.

[12] In this contribution, „self-employment" and „being entrepreneur" are used as synonyms. Self-employed persons are thereby understood as people who run their own business. For a discussion of differences and similarities between both constructs see Parker (2004, pp. 5-8).

Bergmann & Sternberg (2007) for an overview of possible determinants of becoming self-employed). Caliendo, Fossen & Kritikos (2011) emphasize the importance of personality traits such as openness for experience and extraversion regarding the decision to become an entrepreneur. Hence, biased results are likely to occur if this issue of sample selection is not taken into account. *Second*, previous studies revealed that the rent of some determinants of earnings (for example schooling) is different in self-employment, which ought to be considered as well. *Third*, the measurement of "earnings" in the context of self-employment is connected with several problems which possibly hinder the comparability of wage-employed and self-employed earnings. *Fourth*, the group of entrepreneurs is heterogeneous which could lead to different earnings effects for different subgroups. As a result, previous studies often suffer from a methodological approach that handles these difficulties in an insufficient way.

Therefore, this contribution analyzes possible earnings differentials by using data of GSOEP from 1984 to 2008. In order to control for a possible sample selection bias, a fixed-effects estimator is conducted. Different ways of earnings determination are methodologically allowed by interacting the wage-employment vs. self-employment dummy variable with other influence factors such as individual and job-specific characteristics. Possible heterogeneity within the self-employment group with respect to earnings effects is investigated by differentiating between short-term and long-term earnings effects of the transition into self-employment. In addition, different subgroups with respect to gender or occupation, for instance, are investigated more thoroughly.

The remainder of this paper is structured as follows: Section 3.2 presents a review over the existing literature to this topic. In section 3.3, some theoretical considerations are made. Chapter 3.4 illustrates the methodology and describes the data. Section 3.5 contains the empirical results. Finally, 3.6 discusses the findings and gives some concluding remarks.

3.2 Literature Review

The existing research on this topic is rather scarce (van Praag & Versloot, 2008, p. 62). However, there are some contributions that analyze earnings differentials more profoundly.

In a seminal paper, Hamilton (2000) examines the observed positive earnings differential between wage- and self-employment in the US, based on data of non-agricultural male workers from the years 1983 until 1986. He thereby uses nine four-month waves of the Survey of In-

come and Program Participation (SIPP). However, he does not use panel estimators so that potential unobservable heterogeneity is not captured. He conducts separate wage regressions for both self-employed workers and wage-employed workers. Hence, he does not explore a certain "switching rent" when moving from one to another sector, but he obtains rather indirect findings: He finds that self-employed workers have both lower initial earnings and lower income increases over time than wage-employed workers. The results are stable for different measures of self-employment earnings and across industries.

Kawaguchi (2002) replicates Hamilton´s results with the 1985-1998 data of the US National Longitudinal Survey of Youth (NLSY), restricted to white male workers. He finds that self-employed workers achieve lower returns according to their work experience and tenure and, as a result, earn considerably less which holds true for experienced individuals in particular. However, these are results of a simple OLS estimation. When accounting for unobserved heterogeneity by using a fixed-effects estimator, the differential shrinks considerably. These findings indicate that self-employment earnings are heavily influenced by selection effects.

The main focus of van Praag, van Witteloostuijn & van der Sluis (2009) is on different returns to education in the wage- and self-employment sector. Using NLSY data from 1979 until 2000, they find that entrepreneurs obtain higher returns on their (formal) education. Moreover, their results indicate that self-employed workers have more personal control over their work environment which influences the returns to education. However, when accounting for unobserved characteristics and possible selection biases, the earnings effect of self-employment becomes insignificant.

There are several other contributions that confirm different returns to education for self-employed workers, see for example Williams (2003) for the German labor market. He uses cross-sectional GSOEP data of 1997 in order to investigate the connection between schooling as well as work experience and earnings. He thereby differentiates between wage-employed and self-employed workers. His results show that the returns to formal education are lower and, depending on the chosen specification, not significant in self-employment. Moreover, prior work experience in self-employment is connected with a lower premium on wage-employment earnings than prior work experience in wage-employment is.

Furthermore, there are some other contributions that deal with incomes of entrepreneurs in Germany. Constant & Shachmurove (2006) compare entrepreneurial incomes of immigrants

and natives to them of their wage-employment counterparts. Thereby, they use cross-sectional GSOEP data of 2000. In order to explore possible income differences, they make use of the rather indirect approach of Hamilton (2000): They only compare age-earnings profiles of self-employed and wage-employed in both groups Germans and immigrants (controlled for other income determinants and for selectivity). Doing so, they find an income profile for self-employed foreigners which is higher than the income profile of foreign employees. The same result can be found for Germans. However, as they only use cross-sectional data, it is not possible to speak of earnings *effects* of self-employment.

One step further, Block, Sandner, Wagner & Weiglein (2009) investigate the effects on earnings when foreign workers enter self-employment. They use longitudinal GSOEP data from 1984 to 2004 and restrict their sample to males from West-Germany. In order to estimate the income effects, they run Mincer-type earnings regressions with random effects. They find that foreigners denote higher earnings in self-employment than in wage-employment. Furthermore, their results indicate that foreign workers compared to Germans have higher earnings increases due to the entry into self-employment. However, their approach is only partly appropriate to handle the methodological difficulties described in chapter 3.1 as they do not control for possible selectivity and for different income determinants in wage-employment compared to self-employment.

The focus of Constant (2009) is on income differences between self-employed, wage-employed and non-employed women, differentiated by their ethnicity. Furthermore, she makes a distinction between employees with highly qualified and extensive managerial tasks (called “salaried businesswomen”) and “normal” employees. She uses cross-sectional GSOEP data of wave 2002 and restricts her sample to people aged between 20 and 65. Her econometrical approach is similar to the approach used in Constant & Shachmurove (2006) as she compares the conditional age-earnings profiles. Both the profiles of entrepreneurs and of salaried businesswomen are located above the profile of normal employees. The profile of salaried businesswomen is higher in younger ages up to about 30 and again over 50, compared to that of entrepreneurs. Interestingly, there are no significant income differences between Germans and foreigners for both salaried businesswomen and self-employed women.

Lechmann & Schnabel (2012) use cross-sectional data of the BIBB/BAuA Employment Survey of the Working Population on Qualification and Working Conditions in Germany 2006 in order to explore a possible gender earnings gap in self-employment. Their results show an

even higher unconditioned gender gap in self-employment compared to wage-employment. The unexplainable share is higher, too. Considering the explainable part, fewer working hours are by far the most important factor as they explain more than one quarter of the whole gap. The results are somewhat surprising as the unexplained part of the gender gap is often assigned to discrimination by the employer. In addition, the authors argue that discrimination by customers, suppliers, or capital providers are of minor importance. Longitudinal data which could capture some kinds of unobserved heterogeneity may help to increase the explained part of the gender gap.

Besides, there are some contributions that compare the income distributions of entrepreneurs to employees. Merz (2004) concentrates on people in Germany who earn high incomes. He uses data of the German wage and income tax statistics (Lohn- und Einkommenssteuerstatistik) 1995 which is a census of all people in Germany who had to pay taxes in a particular year. However, Merz only uses a representative sample of 10 percent. His most important finding for the research question of this contribution is that self-employed people are relatively more present at the top of the income distribution.

More profoundly, Braakmann (2007) explores the income differential between self-employed and wage-employed workers in Germany. His analyzes are based on GSOEP data from 2000 to 2005 that are restricted to German males who are between 25 and 55 years old. He finds that differentials in earnings are not due to endowment differences with respect to labor-market characteristics, but rather due to different coefficients for these characteristics. Moreover, he finds that self-employed below the 40 percent quantile would significantly earn more in wage-employment which could be a sign of substantial non-pecuniary benefits of entrepreneurship.

Finally, Fritsch, Kritikos & Rusakova (2012) provide some descriptive evidence in a recent report. They make use of data of the German Mikrozensus from 2001 to 2004 and focus on business starters. Given that they have survived in self-employment, 38 percent of people who started an own business in 2001 earn more 3 years later. 45 percent earn roughly the same, 17 percent less.

To sum up, there are some contributions which focus on income differences between self-employed and wage-employed. In most cases, though, analyses are on a cross-sectional base and/or suffer from other methodological constraints.

3.3 Theoretical Considerations

Workers should move to self-employment if they expect a higher utility as in their present occupation (or in unemployment). In the following, it is assumed that the utility of an occupation depends on two different forms of influence factors: First, there are monetary rewards that wage-employed workers receive in terms of wages or salaries (in the broadest sense, i.e. including non-pecuniary benefits like a company car or pecuniary benefits such as pension stakes). For self-employed workers, monetary rewards are funds they can extract out of their business for personal purposes. Second, there could also be some non-monetary rewards, for example enjoying the work or the possibility to align private life with occupational life through flexible working time. A worker will choose the occupation that is connected with the highest utility. The decision depends on individual preferences.

The literature offers arguments for both higher and lower earnings of self-employed compared to wage-employed people. First, entrepreneurs could face a higher autonomy in their job because they are not embedded in a firm hierarchy that is characterized by vertical instructions and control Hamilton (2000). This is true for both work contents (in particular the purpose of the business) and the order in which they are executed. Benz & Frey (2008) are able to prove empirically that self-employed workers have a higher procedural utility than wage-employed workers. Hence, they are more satisfied with the way their work output is achieved. The authors ascribe this finding to a higher degree of self-determination and freedom that entrepreneurs experience during work. Block & Köllinger (2009) find that workers who become self-employed care for money, but also strive to achieve independence and to live their creativity. In the view of Hamilton (2000), this benefit from non-monetary sources is sufficient for workers to accept a lower income when switching to self-employment.

Astebro & Thompson (2009) also refer to the non-monetary rewards of self-employment: Entrepreneurs have a special “taste for variety” making them seek as much variety in their occupational life as possible. However, firms are often characterized by a more or less high division of labor which leads to specialization on single jobs. Hence, the tasks on jobs within a firm hierarchy are rather specific. In contrast, tasks of self-employed workers are much more widespread. Lazear (2005) argues that entrepreneurs have to be a “jack-of-all-trades” which indicates that they need talents in many fields, e.g. human resource management, sales or finance management. He is able to provide evidence that entrepreneurs possess a broad talent set while employees have more specialized skills. Based on this “jack-of-all-trades”-

argument, Astebro & Thompson (2009) argue that if there is a free occupational choice, workers with a preference for a job providing a great variety are more likely to move into self-employment. Assuming that this variety is a substitute for monetary rewards, this argument would also permit a lower income in self-employment.

On the other hand, there are also aspects in favor of higher earnings in self-employment. Douhan & van Praag (2009) refer to the point that entrepreneurs may make use of their own skills and knowledge more effectively than in wage-employment. As their own boss, they may adjust the intra-firm processes so that the returns on their human capital will be maximized. In contrast, adjustments of work processes to the skills of single employees are only possible up to a certain degree due to the constraints by the organizational structure of the firm. Consequently, it could be said that the human capital in self-employment is used more efficiently than in wage-employment, which fosters a higher income for entrepreneurs.

According to Jensen & Shore (2008), earnings of self-employed people are more volatile. Therefore, income risks for entrepreneurs are obviously higher than for employees. Under the common assumption of risk aversion, this risk has to be compensated so that the worker is willing to move into self-employment. In this case, a positive income differential between self-employment and wage-employment can be regarded as a risk premium.

The ideas of human capital and agency models could also be relevant. They postulate different earnings profiles in both sectors (Lazear, 1981; Lazear & Moore, 1984). Investments in the human capital of entrepreneurs have to be paid totally by themselves. Particularly at the beginning of an entrepreneurial occupation, it seems likely that financial funds have to be invested, for instance in knowledge about the industry or in learning of accounting rules. Consequently, the income at the beginning of a job is lower when being self-employed. However, returns to these investments over time can be absorbed completely by the entrepreneur, while investment models assume that for individuals in wage-employment both investment costs and returns are shared between employer and employee (Becker, 1962). In contrast, agency models predict an opposite trend: Whereas wage-employment occupations ask for incentives to prevent shirking behavior by the employees, this problem does not exist in self-employment occupations. Such incentives are often set by increasing wage profiles over time which leads to lower incomes at the beginning and higher incomes at the end of the occupational life. According to these two models, it depends on the time within the occupational career if an entrepreneur earns more or less than an employee. However, these arguments are

only relevant for analyses of income differences between wage-employed and self-employed, not for analyses of earnings effects connected with switches to or from an entrepreneurial occupation.

In conclusion, it is not possible to make a straightforward theoretical prediction. Workers could earn more in self-employment by using their skills and knowledge more efficiently. But it is also possible that they receive lower monetary rewards because the non-monetary benefits are substantial. Finally, both effects could also occur together leading to the question which of the two effects is stronger.

3.4 Data, Variables, and Methodology

3.4.1 Dataset

The analysis in this contribution is based on the GSOEP.[13] Individuals are asked on an annual base about several areas of life including general attitudes and their employment relationship. The panel structure allows for longitudinal analyzes of individual careers and, in particular, for the observation of individual transitions from wage-employment into self-employment (and vice versa) from 1984 to 2008. The dataset is restricted to people who are employed full-time in the private or the public sector. Apprentices and trainees are not included. Furthermore, the agricultural sector is excluded as commonly accepted for studies with respect to this topic. Altogether, the dataset with an unbalanced panel structure consists of 135,330 year-observations of 20,793 people, including 10,381 year-observations (i.e. 7.7 percent) of self-employed workers.

3.4.2 Variables

The job status is defined by a dummy variable: For wage-employed people the variable adopts "0", for self-employed people "1". Self-employment is understood in a relatively broad fashion as it includes all workers who run their own business. Hence, this group includes nascent entrepreneurs and also people in liberal professions (in German: "Freie Berufe") like pharmacists or lawyers, for instance. Table 3.1 provides an overview of the dataset structure. Self-

[13] See chapter 2.4.1 for a description of the dataset.

employed workers are more seldom female, more frequently German and more often married. On average, they are older than wage-employed workers and have received more formal schooling. More frequently, they work in the occupation they are trained for. The size of the enterprise self-employed workers are working in is considerably smaller. Their weekly working time is much longer. They work more often in the trade and finance industries and less frequent in the manufacturing sector. For an overview of the definition and the operationalization of all variables used in this contribution, see Table A 6 in the appendix.

Table 3.1: Descriptive statistics

		SE workers N=10,381	WE workers N=124,949	All N=135,330
Sex				
Female		0.239	0.329	0.322
Male		0.761	0.671	0.678
Nationality				
German		0.913	0.839	0.845
Foreigner		0.087	0.161	0.155
Marital Status				
Non married		0.266	0.334	0.329
Married		0.734	0.666	0.671
Children in household				
No children		0.576	0.609	0.606
At least 1 child		0.424	0.391	0.394
Age [years]	Mean	44.4	40.0	40.4
	SD	10.5	10.9	11.0
Schooling [years]	Mean	13.0	11.9	12.0
	SD	2.9	2.7	2.7
Unemployment experience [months]	Mean	0.36	0.35	0.35
	SD	1.06	1.04	1.05
In occupation trained for				
Yes		0.630	0.572	0.576
No		0.370	0.428	0.424
In public sector				
Yes		0.015	0.271	0.251
No		0.985	0.729	0.749
Firm size				
Self-employed without employees		0.298	0.001	0.024
Up to 20 employees		0.624	0.185	0.219
Up to 200 employees		0.044	0.295	0.276
Up to 2,000 employees		0.011	0.255	0.236
Over 2,000 employees		0.022	0.265	0.246
Tenure [years]	Mean	10.2	11.0	11.0
	SD	10.0	9.8	9.8
Weekly working time [hours]	Mean	52.1	42.7	43.4
	SD	13.7	7.3	8.3
Industry				
Manufacturing		0.158	0.380	0.363
Construction		0.152	0.088	0.093
Trade		0.299	0.174	0.184
Finance		0.220	0.093	0.102
Services		0.171	0.265	0.257

Note: Tabulated are fractions.

Entrepreneurship literature hints on several possible problems connected with the *measurement of self-employment earnings* (Parker, 2004, pp. 14-16). In general, it is assumed:

$$\text{Net profit} \equiv \text{Revenue} - \text{Costs} \equiv \text{Draw} + \text{Retained earnings} \tag{3.1}$$

The net profit of a firm is thereby the difference between the revenue and all costs including taxes. Entrepreneurs can dispose of this profit: Either they extract it for their personal purposes, or they leave it within the firm (= invest it). Comparing the earnings in wage-employment and self-employment, it seems reasonable to focus on the financial funds the entrepreneur uses for his own purposes. In both cases, the benefitted person is able to dispose directly over the money. The GSOEP questionnaire asks for income from self-employment which entrepreneurs are supposed to understand in this sense.

However, there are some indications in the literature that self-employment earnings are over- or underestimated. On the one hand, self-employment earnings may be underreported as survey participants mistrust the independence of the interviewer from tax agencies. On the other hand, the income of entrepreneurs could also be overreported if they are a mixture of labor and capital income. Furthermore, German employers obligatorily discharge some parts of the gross wage to social insurance systems as for example pension insurance or unemployment insurance. About the same amount is paid by the employer additionally, whereas this money is normally not considered by the employees as part of their wage. For entrepreneurs, there are no legal obligations to pay into such systems. Hence, their income should be higher. To be fair, the self-employed could also report earnings which they pay to a private illness insurance afterwards. Consequently, these parts of income would not be disposable in the above defined sense. However, at least some part of the investments in their own firms (thus lowering the amount to which funds can be extracted by the entrepreneur for consumption in the present) can also be seen as financial precaution for their future.

In conclusion, it cannot be stated that self-employment earnings are systematically biased towards one direction. However, the potentially restricted validity of earnings statements especially of self-employed workers should be taken into account when discussing the results.

3.4.3 Methodology

For both wage-employed and self-employed people it is assumed that the determination of their income follows the logic of the Mincerian earnings regression. Thus, logarithmized

gross earnings act as dependent variable. As workers are supposed to calculate with the whole monthly sum they get from a job rather than with a virtual hourly rate, the monthly income is chosen as the dependent variable in all of the regressions. The dataset contains information from a time span of 24 years, thus the earnings are inflated by the consumer price index to the prices of 2008.

As a reference, a simple OLS model is conducted in order to examine average differences. However, the entrance into self-employment should not be random, but dependent on many factors such as individual or job-specific characteristics. Hence, a model which does not account for these characteristics would lead to results biased by sample selection. Previous contributions which investigated cross-sectional data used a two-stage Heckman correction to handle this problem. It corrects the Mincerian equation for differences with respect to the probability of becoming self-employed. The disadvantage of these studies is that one cannot control for unobserved heterogeneity that is likely to affect earnings. However, the transfer of the Heckman correction on longitudinal data is not trivial. In this paper, a simple fixed-effects estimator is applied. The advantage of this method is that unobserved individual heterogeneity, like motivation or personal traits possibly affecting earnings, can be filtered. Furthermore, the individual fixed effects should capture selectivity due to "permanent disposition, inclination and aptness for entrepreneurial activity" (van Praag, van Witteloostuijn & van der Sluis, 2009, p. 15). Only non-permanent selectivity, that is special circumstances or events which foster the entrance into self-employment, cannot be captured by the fixed-effects estimator.

Previous research showed that the return to schooling for self-employed people is different from that of wage-employed workers (see for example Williams (2003) for the German labor market). We can assume that there should also be differences with respect to other determinants of individual earnings (see Parker (2004, pp. 20-23) for an overview). Hamilton (2000) and Williams (2003) handled this problem by estimating two different models for wage-employed and self-employed workers. Though, this approach makes it impossible to estimate the direct earnings effect of switching from the wage sector to the self-employed sector (and vice versa). Hartog, Van Praag & Van der Sluis (2010) extended their model by interactions of all earnings determinants with the dummy "self-employed". In consequence, the coefficients of schooling, age, and other factors measure income effects of wage-employed workers. Coefficients of interaction effects reveal possible differences between the two sectors with respect to income determinants. The dummy "self-employed yes/no" (below: *SE*) indicates

the earnings change when switching from wage-employment (below: *WE*) to self-employment, accounting for (permanent) selectivity and different ways of earnings determination in both sectors. This approach is also used in this contribution. The whole model can be described by

$$\text{Log(Monthly earnings)} = \propto + SE \cdot \beta + A'\gamma + SE \cdot A'\delta + \varepsilon \qquad (3.2)$$

whereas α stands for the intercept and *SE* for a dummy that adopts "0" for workers in the wage sector and "1" for those in self-employment. *A* is a vector of several characteristics that potentially exert influence on earnings: socio-demographics like sex, the nationality or the marital status, variables that act as proxies for the worker´s human capital (years of schooling for formal education, age and a dummy for working in the occupation someone was trained for to capture general occupational skills and tenure for firm-specific human capital) and finally firm-specific factors like industry or firm size. Control variables for the region and the observation year are also included. *SE·A* is a vector of interactions between these influence factors and SE (except for the region and the observation year). ε is an error term. β indicates the earnings effect of being (OLS estimations) or becoming (fixed-effects estimations) self-employed. γ and δ are coefficient vectors of earnings effects of the other determinants and their interactions with *SE*.

In consequence, the resulting income effect of self-employment (i.e. the coefficient of *SE*) is not independent of the interaction effects. Hence, the coefficient can only be interpreted directly when all factors interacted with *SE* adopt the value of zero. In the case of dummy and categorical variables, one can choose a certain reference category. With respect to continuous variables as for instance individual age, the value zero is not meaningful in most cases. Therefore, all values of continuous variables are demeaned by the mean of the whole sample. By doing so, the coefficient of *SE* now indicates the earnings effect of becoming self-employed for a person within the chosen reference categories respectively with average values for the continuous variables.

Conventional regression models capture observable heterogeneity, for example with respect to age or sex, simply by integrating these variables on the right hand side of the regression equation. However, individual unobservable characteristics cannot be captured as easily due to the lack of data. Instead, a fixed-effects estimator uses the *within transformation*. A simple

model with one explanatory variable shall adopt the following form (Wooldridge, 2006, pp. 486-487):

$$y_{it} = \alpha_i + \beta_1 \cdot x_{it} + u_{it} \tag{3.3}$$

whereas *i* stands for the person and *t* for the time of observation. Averaging y and x over time leads to

$$\bar{y}_i = \alpha_i + \beta_1 \cdot \bar{x}_i + \bar{u}_i \quad . \tag{3.4}$$

By subtracting (3.4) from (3.3), we get the equation

$$(y_{it} - \bar{y}_i) = \beta_1 \cdot (x_{it} - \bar{x}_i) + (u_{it} - \bar{u}_i) \quad . \tag{3.5}$$

With this approach, the time-constant individual effect (= α_i) drops out of the equation and a simple pooled OLS estimator can be used. In the context of this study, the coefficient of *SE* is only influenced by the observations of those workers who are at least one period in wage-employment and also at least one period in self-employment (otherwise, $(x_{it} - \bar{x}_i)$ equals always zero). In consequence, earnings of "long-time" entrepreneurs become irrelevant. Furthermore, movements to or out of self-employment have the equal impact on the effect. Observations conducted right after the transition do have the same value as later observations. That way, the coefficient of the fixed-effects estimation indicates the average income difference between an occupation in wage-employment and self-employment, controlled for constant, individual, and unobserved heterogeneity.

In a second step, the short-term effect of switching from one status to the other is analyzed. For this purpose, a first-differences estimation will be applied. This approach also eliminates the individual effects, but in a different way (Cameron & Trivedi, 2009, p. 263):

$$(y_{it} - y_{i,t-1}) = \beta_1 \cdot \left(x_{it} - x_{i,t-1}\right) + (u_{it} - u_{i,t-1}) \tag{3.6}$$

In each period, the difference between the actual period and the preceding period will be computed. The coefficient of *SE* depends only on the observations right before and after a switch. Hence, it indicates the short-term effect.

3.5 Empirical Results

In this chapter, empirical results with respect to earnings differences between self-employed and wage-employed workers are illustrated. To give a first overview, some descriptive results are shown in chapter 3.5.1.

3.5.1 Descriptive Results

Table 3.2 delivers a first glance on differences with respect to earnings. It describes the monetary rewards of entrepreneurs and employees. Three aspects are evident: First, self-employed workers earn, on average, significantly more than wage-employed workers. This holds true when looking at monthly as well as hourly earnings[14]. Second, income differences are smaller on an hourly base. This indicates that self-employed workers receive higher monthly rewards, but work more hours, too. Third, the variance of entrepreneur rewards is higher than that of employee´s earnings. In addition, the differences between median payments are smaller than those between mean payments. That is, the self-employment sector is much more heterogeneous than the wage-employment sector with respect to earnings.

Table 3.2: Self-employment status and earnings

		SE workers (n = 10,381)	WE workers (n = 124,949)	All workers (n = 135,330)
Monthly earnings[1] [euro]	Mean	3,828	2,689	2,777
	SD	3,113	1,332	1,572
	10%	1,176	1,432	1,411
	25%	1,919	1,877	1,877
	Median	3,027	2,420	2,446
	75%	4,796	3,181	3,253
	90%	7,232	4,207	4,411
Hourly earnings[1] [Euro]	Mean	18.58	15.09	15.36
	SD	18.62	12.53	13.13
	10%	5.41	7.72	7.54
	25%	8.52	10.31	10.20
	Median	13.84	13.45	13.47
	75%	22.56	17.49	17.73
	90%	35.22	22.77	23.49

[1]In prices of 2008

[14] Hourly earnings are computed as follows:

*Hourly Earnings = (Monthly Earnings / (Weekly Working Time * 52/12))*

Figure 3.1: Monthly earnings over time 1984-2008

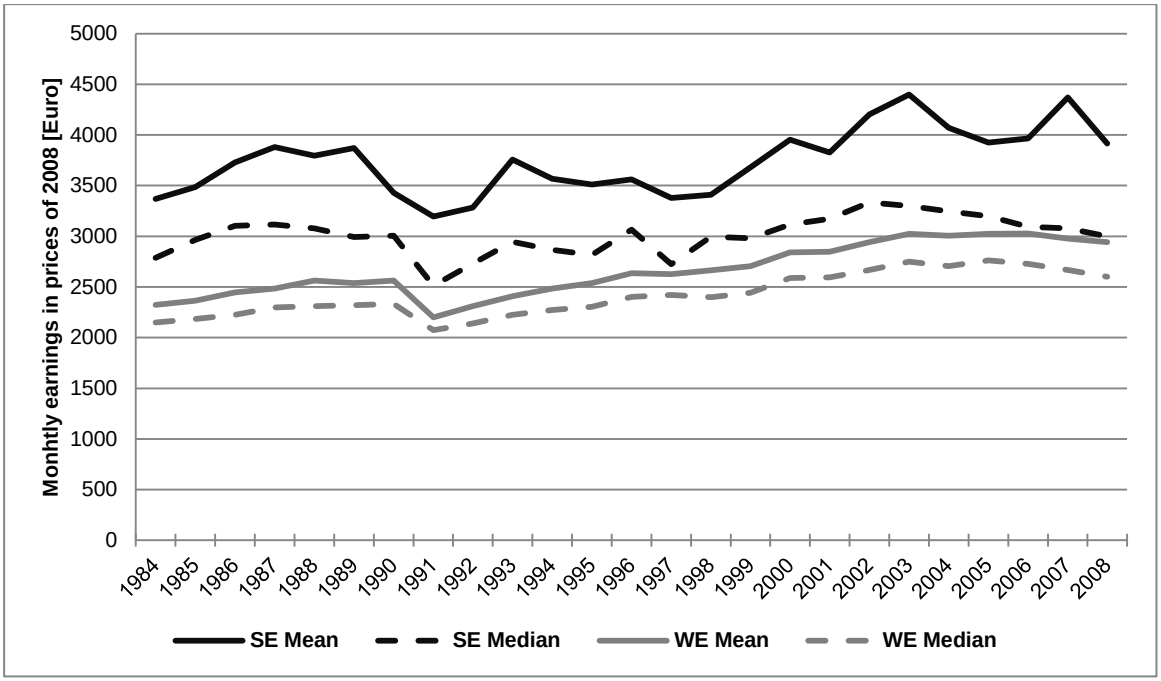

Figure 3.2: Hourly earnings over time 1984-2008

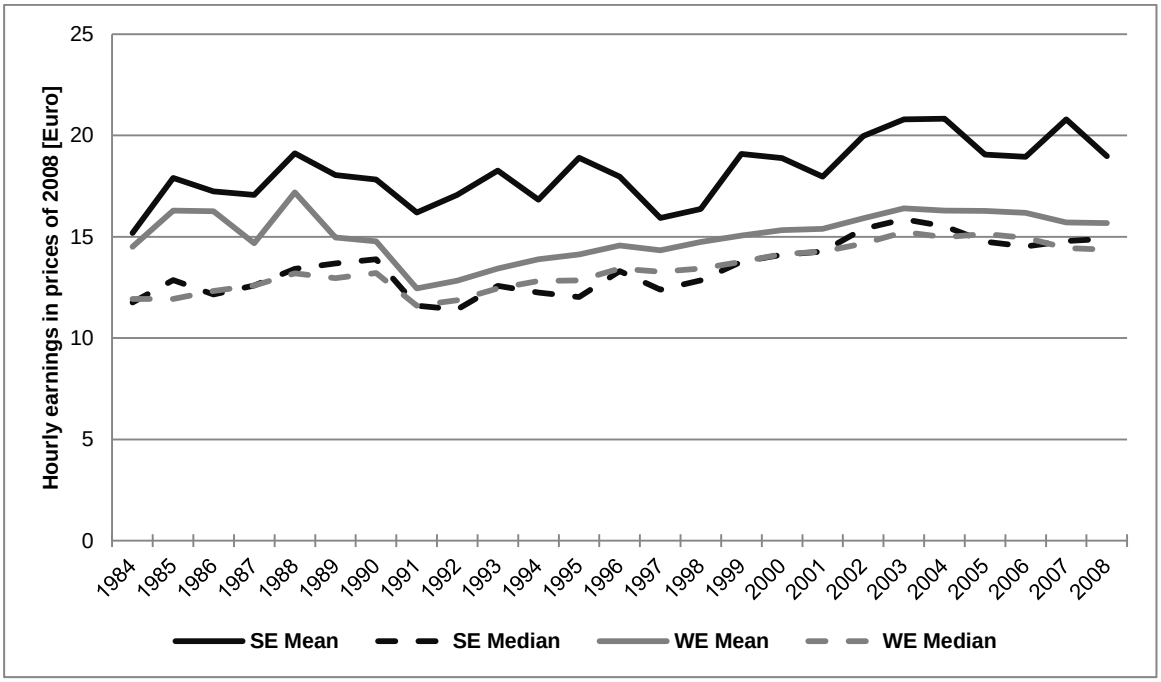

Figure 3.1 and Figure 3.2 show the earnings trend over time. Figure 3.1 describes monthly earnings, Figure 3.2 presents hourly earnings. Both diagrams confirm the findings of Table 2 as self-employed workers have considerably higher mean earnings while the difference is considerably smaller when looking at the median numbers. On an hourly basis, a difference is

not even recognizable. There is no time trend as the differential between self-employed and wage-employed income is stable over the whole time span.

In Table 3.3, relative increases in income from the period right before until the period directly after a switch to or from self-employment are shown. Doing this, the sample size decreases in the amount of 22 percent due to the fact that the GSOEP is an unbalanced panel. As a reference, income of workers without a switch are also tabulated. There are some interesting details: First, one can see that workers who move from the wage sector into the entrepreneurial sector have on average increasing earnings. The median rise of monthly income is 8.7 percent. In contrast, the monthly incomes of workers who move from self-employment to wage-employment decreases by 2.1 percent. Overall, 59.1 percent of those who enter self-employment "win" after the switch, that is they receive higher monthly earnings. In contrast to that, 57.4 percent denote lower monetary rewards when they switch from self-employment to wage-employment.

Table 3.3: Self-employment status and earnings increases

		No switch WE t-1=WE, t=WE (n = 97,641)	Switch SE→WE t-1=SE, t=WE (n = 498)	Switch WE→SE t-1=WE, t=SE (n = 685)	No switch SE t-1=SE, t=SE (n = 6,885)
Increase in monthly earnings[1] [percentage]	Mean	+0.051	+0.145	+0.334	+0.144
	SD	+0.323	+1.424	+1.172	+0.882
	10%	–0.137	–0.505	–0.379	–0.392
	25%	–0.036	–0.292	–0.126	–0.180
	50%	+0.013	–0.021	+0.087	–0.010
	75%	+0.096	+0.205	+0.472	+0.246
	90%	+0.242	+0.630	+1.075	+0.664
	Winners[2]	0.551	0.426	0.591	0.474
Increase in hourly earnings[1] [percentage]	Mean	+0.087	+0.304	+0.344	+0.262
	SD	+0.851	+1.668	+1.381	+2.938
	10%	–0.175	–0.549	–0.462	–0.445
	25%	–0.062	–0.258	–0.239	–0.205
	50%	+0.018	+0.005	–0.006	+0.009
	75%	+0.122	+0.346	+0.424	+0.313
	90%	+0.290	+0.912	+1.095	+0.878
	Winners[2]	0.563	0.506	0.493	0.511

[1]In prices of 2008
[2]"Winners" are workers who denote a positive increase in earnings from period t-1 to period t.

However, the results are quite different when looking at the hourly earnings. Those who switch into self-employment have a median decrease of their hourly income of 0.6 percent, while workers who move from self-employment to wage-employment report an increase in income of 0.5 percent. Hence, a switch to self-employment appears to be connected with a

higher income but also comes along with more working hours. Finally, we can see that earnings differences over two years are considerably higher when workers feature a change in their job status which allows for the conclusion that entry into self-employment should also influences the income of workers.

Earnings depend not only on the employment status, but also on other factors like individual or job-specific characteristics. Furthermore, we can assume that different determinants have a different influence on earnings of self-employed and wage-employed people. Finally, selection effects could influence the decision to become an entrepreneur. These are arguments that are in favor of the conclusion that the descriptive results are only first indications of the true effect of self-employment on income. Hence, several multivariate analyses are conducted in the following.

3.5.2 Multivariate Results

Results of regressions on monthly gross income are shown in Table 3.4. In model (1), an OLS estimation without interaction variables is conducted. This approach assumes that the different determinants have the same influence on earnings in both wage-employment and self-employment. Under this assumption, entrepreneurs earn 18.7[15] percent more than employees. In model (2), a fixed-effects estimator is used in order to capture unobservable heterogeneity that could also influence incomes. The earnings difference of 10.8 percent is considerably smaller which indicates that unobservable characteristics are highly relevant.

In model (3), all factors are interacted with the self-employment dummy. The main effects are rather stable. However, the interaction effects are partly significant, too. This indicates that many determinants, indeed, act differently in the respective sectors. Especially foreigners benefit from an entrepreneurial occupation, while additional working time is connected with a lower earnings premium when the worker is self-employed. Overall, a self-employed worker receives earnings that are 13.0 percent higher, compared to an occupation with the same characteristics in wage-employment.

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[15] As the dependent variable is logarithmized, coefficients have to be transformed by the exponential function to get the exact effects respectively differences. The table contains the estimated coefficients.

Table 3.4: Mincer regressions

	dependent variable: log(monthly earnings in euro of prices of 2008)			
	OLS (1)	Fixed effects (2)	Fixed effects (3)	Fixed effects (4)
Self-employed (SE)	0.1718*** (0.0080)	0.1029*** (0.0158)	0.1221*** (0.0391)	0.0917** (0.0384)
Female SE x Female	-0.1986*** (0.0023)		 -0.0154 (0.0353)	 -0.0133 (0.0361)
Foreigner SE x Foreigner	-0.0291*** (0.0028)	0.0430*** (0.0166)	0.0320* (0.0171) 0.1789*** (0.0432)	0.0298* (0.0172) 0.1792*** (0.0428)
Married SE x Married	0.0236*** (0.0024)	0.0248*** (0.0046)	0.0247*** (0.0044) -0.0038 (0.0236)	0.0256*** (0.0045) -0.0033 (0.0236)
Children in household SE x Children	0.0254*** (0.0023)	-0.0057* (0.0034)	-0.0058* (0.0033) 0.0041 (0.0182)	-0.0061* (0.0033) 0.0079 (0.0184)
Age – mean(age) SE x [Age – mean(age)] (Age – mean(age))^2*100 SE x [(Age – mean(age))^2]*100	0.0063*** (0.0001) -0.0352*** (0.0010)	0.0195*** (0.0005) -0.0449*** (0.0019)	0.0198*** (0.0005) -0.0052*** (0.0018) -0.0427*** (0.0018) 0.0001 (0.0092)	0.0197*** (0.0005) -0.0057*** (0.0018) -0.0433*** (0.0018) 0.0005 (0.0093)
Schooling – mean(schooling) SE x [Schooling – mean(schooling)]	0.0537*** (0.0005)	0.0134*** (0.0026)	0.0136*** (0.0026) -0.0066 (0.0056)	0.0136*** (0.0026) -0.0062 (0.0057)
Unemp. exp. – mean(unemp. exp.) SE x [Unemp. exp. – mean(unemp. exp.)]	-0.0306*** (0.0010)	-0.0607*** (0.0049)	-0.0603*** (0.0048) -0.0074 (0.0128)	-0.0607*** (0.0048) -0.0093 (0.0134)
In occupation trained for SE x In occupation trained for	0.0729*** (0.0022)	0.0144*** (0.0036)	0.0145*** (0.0034) -0.0021 (0.0210)	0.0128*** (0.0034) 0.0044 (0.0210)
In public sector SE x In public sector	-0.0245*** (0.0031)	-0.0189*** (0.0057)	-0.0198*** (0.0056) 0.0150 (0.0461)	-0.0135** (0.0056) 0.0221 (0.0464)
Tenure – mean(tenure) SE x [Tenure – mean(tenure)] (Tenure – mean(tenure))^2*100 SE x [(Tenure – mean(tenure))^2]*100	0.0060*** (0.0002) -0.0154*** (0.0011)	0.0012*** (0.0004) -0.0122*** (0.0019)	0.0011*** (0.0004) 0.0021 (0.0018) -0.0125*** (0.0018) -0.0136 (0.0094)	0.0013*** (0.0004) 0.0037** (0.0019) -0.0130*** (0.0018) -0.0161* (0.0094)
Working time – mean(working time) SE x [Working time – mean(working time)]	0.0086*** (0.0002)	0.0041*** (0.0002)	0.0043*** (0.0002) -0.0012** (0.0006)	0.0042*** (0.0002) -0.0010* (0.0006)
Industry Manufacturing Construction Trade Finance Services SE x Manufacturing SE x Construction SE x Trade SE x Finance SE x Services	 0.1012*** (0.0030) 0.1105*** (0.0040) *--- reference ---* 0.1770*** (0.0044) 0.0746*** (0.0037)	 0.0334*** (0.0058) 0.0542*** (0.0083) *--- reference ---* 0.0298*** (0.0089) -0.0069 (0.0080)	 0.0413*** (0.0057) 0.0571*** (0.0082) *--- reference ---* 0.0287*** (0.0086) -0.0036 (0.0078) -0.0064 (0.0274) -0.0221 (0.0319) *--- reference ---* 0.0116 (0.0313) -0.0045 (0.0350)	 0.0360*** (0.0056) 0.0590*** (0.0081) *--- reference ---* 0.0276*** (0.0085) -0.0066 (0.0077) -0.0075 (0.0273) -0.0253 (0.0315) *--- reference ---* 0.0256 (0.0313) 0.0034 (0.0348)
Firm Size Self-employed without employees Up to 20 employees Up to 200 employees Up to 2,000 employees Over 2,000 employees SE x self-employed without employees SE x Up to 20 employees SE x Up to 200 employees SE x Up to 2,000 employees SE x Over 2,000 employees	 -0.1541*** (0.0142) *--- reference ---* 0.1166*** (0.0030) 0.1717*** (0.0031) 0.2146*** (0.0032)	 -0.0692*** (0.0167) *--- reference ---* 0.0375*** (0.0047) 0.0490*** (0.0056) 0.0620*** (0.0061)	 -0.0712 (0.0759) *--- reference ---* 0.0351*** (0.0047) 0.0487*** (0.0055) 0.0632*** (0.0060) 0.0018 (0.0772) *--- reference ---* 0.1173*** (0.0374) -0.0212 (0.0600) -0.1209*** (0.0433)	
Intercept	7.5880*** (0.0070)	7.8014*** (0.0220)	7.8014*** (0.0219)	7.8390*** (0.0214)
R^2 Overall Within Between	0.4800	0.2310 0.2081 0.2470	0.2275 0.2046 0.2446	0.2164 0.2044 0.2321
Observations (Persons)	135,330	135,330 (20,793)		

Notes: Robust standard errors in parentheses. Also controlled for region and year of observation.

Using this approach, we assume that the switch from one occupation to the other has no impact on other attributes. This assumption is not problematic when looking at socio-demographic characteristics like personal age or the marital status. In addition, Lohmann & Luber (2004) show that German workers often move into self-employment within the same industry as they were employed before. However, most of the entries into self-employment should be connected with a switch into a lower firm size class since newly established businesses usually start with a smaller number of employees (if any). Therefore, model (4) does not control for firm size. Yet, the earnings difference indicated by the coefficient of the self-employment dummy already embraces the effect of moving into a smaller firm size class. It decreases to 9.6 percent, but remains significant.

The earnings effect remains significant across industries. However, some smaller variation in size are observable: While a switch into self-employment within the construction industry is assiociated with an income difference of 7.3 percent, the effect within the services industry reaches 9.1 percent. Within the finance and insurance industry, a switch is connected with an earnings difference of 10.8 percent. A Hausman test is performed and its significant result reveals that a random-effects estimator would not be consistent. However, the application of a random-effects model leads to similar results as those of a fixed-effects model.

As described above, the earnings effect gained from a fixed-effects model indicates the average difference over time between the incomes in wage-employment and self-employment of a worker that moves from one sector to another. A first-differences estimator reveals the short-term effect. The results are shown in Table 3.5. The sample size is smaller as the systematics of the estimator requires complete data for two subsequent years. With respect to the explaining variables, the model is equivalent to model (4) in Table 3.4. The short-term effect of self-employment is already significant and has almost the same size as the average effect for a switch within the trade industry. A significant result for the finance and insurance industry with an effect of 9.5 percent can also be found. However, there are no significant coefficients with respect to the other industries. Generally, the estimated effects on earnings of the first-differences model are similar to those of the fixed-effects model.

Table 3.5: First-differences Mincer regression

	dependent variable: log(monthly earnings in euro of prices of 2008)
Self-employed (SE)	0.0913** (0.0447)
SE x female	-0.0456 (0.0416)
Foreigner SE x Foreigner	0.0024 (0.0172) 0.1328*** (0.0499)
Married SE x Married	0.0092** (0.0044) 0.0302 (0.0294)
Children in household SE x Children	-0.0085** (0.0036) 0.0182 (0.0249)
Age – mean(age) SE x [Age – mean(age)] $(\text{Age} - \text{mean(age)})^2$*100 SE x $[(\text{Age} - \text{mean(age)})^2]$*100	0.0289*** (0.0007) -0.0050** (0.0022) -0.0697*** (0.0032) 0.0092 (0.0140)
Schooling – mean(schooling) SE x [Schooling – mean(schooling)]	0.0101*** (0.0028) -0.0084 (0.0059)
Unemp. exp. – mean(unemp. exp.) SE x [Unemp. exp. – mean(unemp. exp.)]	-0.0641** (0.0320) 0.0035 (0.0175)
In occupation trained for SE x In occupation trained for	0.0006 (0.0032) -0.0191 (0.0224)
In public sector SE x In public sector	-0.0047 (0.0052) 0.0658 (0.0616)
Tenure – mean(tenure) SE x [Tenure – mean(tenure)] $(\text{Tenure} - \text{mean(tenure)})^2$ SE x $[(\text{Tenure} - \text{mean(tenure)})^2]$	-0.0022*** (0.0006) 0.0040* (0.0023) 0.0003 (0.0037) -0.0095 (0.0149)
Working time – mean(working time) SE x [Working time – mean(working time)]	0.0021*** (0.0001) -0.0006 (0.0005)
Industry Manufacturing Construction Trade Finance Services SE x Manufacturing SE x Construction SE x Trade SE x Finance SE x Services	 0.0176*** (0.0056) 0.0047 (0.0085) *--- reference ---* 0.0158** (0.0076) -0.0182** (0.0079) -0.0306 (0.0291) -0.0228 (0.0336) *--- reference ---* 0.0001 (0.0332) -0.0101 (0.0381)
R^2	0.0202
Observations	105,753

Notes: Clustered standard errors in parentheses. Also controlled for region and year of observation.

First, this finding suggests that the positive financial impact of the switch into self-employment can already be achieved in the short term. However, this is in contrast to the predictions of the investment models. It seems to be the case that the costs of investing in human capital are not as high as the short-term benefits. Second, the functionality of the fixed-effects estimator described above could lead to an underestimation of the income effect: Only workers with both spells in wage-employment and self-employment influence the effect. Hence, entrepreneurs who were already self-employed when they entered the GSOEP and who did not switch into wage-employment do not influence the effect at all. Yet, these entrepreneurs are supposed to manage well-established firms which should be more successful than firms that have been launched only recently. Their income is, indeed, higher: While the median in-

come of workers who are continuously wage-employed is 2.578 €, the median earnings of continuously self-employed workers is 4.046 €. Workers that have both wage-employment and self-employment spells in the GSOEP earn on average 3.011 €. This is an indication that the size of the effect is somewhat underestimated respectively that the long-term effect is only insufficiently captured.

3.5.3 The Role of Working Time

Similar to the considerations with respect to firm size, one could also argue that there is a variation of the weekly work time when switching into self-employment. Controlling for work time within the fixed-effects estimation leads to an income effect of self-employment given a constant number of work hours (precisely: the mean of the whole dataset). However, the descriptive statistics show that entrepreneurs work almost 10 hours more per week than employees. The main effect of work time indicates that a longer work time in wage-employment is correlated with more income. This holds true for self-employment. But due to the negative interaction effect, the total impact is smaller than in wage-employment. Model (2) in Table 3.6 shows the results for an estimation of the monthly earnings without controlling for work time. That way, the effect of self-employment now also includes the fact that self-employed people work longer. Using this approach, the earnings difference rises up to 11.6 percent. This effect is also visible in the short term: A first-differences model which is identical with the model in Table 3.6, but does not control for the work time, reveals a significant income effect of 9.5 percent.

Table 3.6: Mincer Regressions – earnings and working time

		Fixed effects, dependent variable: log(earnings in euro of prices of 2008)		
		Monthly earnings (1)	Monthly earnings (2)	Hourly earnings (3)
Self-employed (SE)		0.0917** (0.0384)	0.1096*** (0.0379)	-0.0351 (0.0406)
Working time – mean(working time) SE x [Working time – mean(working time)]		0.0042*** (0.0002) -0.0010* (0.0006)		
R^2	Overall Within Between	0.2164 0.2044 0.2321	0.2013 0.1952 0.2147	0.1740 0.1140 0.2117
Observations (Persons)		135,330 (20,793)		

Notes: Robust standard errors in parentheses. The models are in all other respects identical to model (4) of Table 3.4.

Other contributions gear to the hourly earnings instead to monthly income. As illustrated above, this seems to not be appropriate. However, the last model (3) reveals the result of a regression of the hourly income. Now, the effect of self-employment is not significant anymore. Altogether, one can conclude that the additional working hours that are connected with an entry into self-employment lead to a higher income on a monthly base, but have no effect on the hourly income.

3.5.4 Investigations of Subgroups

Challenging the results, one could argue that other contributions to this topic focus only on male workers as *female workers* often possess discontinued occupational careers (e.g. due to maternity leaves). As a consequence, the results could be biased. Restricting the data to male participants reveals similar coefficients for both the control variables and the *SE* dummy. However, the restriction to female workers leads to an insignificant, but positive effect of self-employment (see Table 3.7).[16] Hence, there are some hints that male workers benefit more from a switch into self-employment than female workers.

Foreign workers often face considerable disadvantages in the labor market. However, the results regarding the income in self-employment are different. Figure 3.3 show median earnings of Germans and foreigners in wage-employment and self-employment. Whereas there is a significant wage differential for foreign employees, their self-employed counterparts earn as much as German entrepreneurs. The analysis of wage increases when entering self-employment reveals a considerably higher income premium for foreign workers (see Table 3.8). This results holds true when it is additionally controlled for observed and unobserved heterogeneity: The income effect of switching from wage-employment to self-employment is 31.1 percent for foreigners, while it is only 9.6 percent for Germans (see Table 3.9).

[16] Within the dataset, there are 2,477 observations of female entrepreneurs. Moreover, 148 switches from wage-employment to self-employment and 121 switches in the other direction of female workers can be observed.

Table 3.7: Mincer regressions – males vs. females

	Fixed effects, dependent variable: log(monthly earnings in prices of 2008)		
	All (1)	Male (2)	Female (3)
Self-employed (SE)	0.0917** (0.0384)	0.0952** (0.0428)	0.0631 (0.0697)
SE x Female	-0.0133 (0.0361)		
Foreigner SE x Foreigner	0.0298* (0.0172) 0.1792*** (0.0428)	0.0097 (0.0200) 0.2139*** (0.0486)	0.0781** (0.0344) 0.0337 (0.0851)
Married SE x Married	0.0256*** (0.0045) -0.0033 (0.0236)	0.0339*** (0.0058) 0.0024 (0.0276)	0.0068 (0.0067) -0.0128 (0.0469)
Children in household SE x Children	-0.0061* (0.0033) 0.0079 (0.0184)	0.0095** (0.0038) -0.0090 (0.0204)	-0.0473*** (0.0064) 0.0578 (0.0439)
Age – mean(age) SE x [Age – mean(age)] (Age – mean(age))^2*100 SE x [(Age – mean(age))^2]*100	0.0197*** (0.0005) -0.0057*** (0.0018) -0.0433*** (0.0018) 0.0005 (0.0093)	0.0195*** (0.0006) -0.0073*** (0.0022) -0.0004*** (0.0000) -0.0000 (0.0001)	0.0204*** (0.0010) -0.0001 (0.0031) -0.0005*** (0.0000) 0.0001 (0.0002)
Schooling – mean(schooling) SE x [Schooling – mean(schooling)]	0.0136*** (0.0026) -0.0062 (0.0057)	0.0159*** (0.0030) -0.0056 (0.0063)	0.0066 (0.0048) -0.0111 (0.0133)
Unemp. exp. – mean(unemp. exp.) SE x [Unemp. exp. – mean(unemp. exp.)]	-0.0607*** (0.0048) -0.0093 (0.0134)	-0.0649*** (0.0062) -0.0070 (0.0160)	-0.0568*** (0.0076) -0.0148 (0.0196)
In occupation trained for SE x In occupation trained for	0.0128*** (0.0034) 0.0044 (0.0210)	0.0087** (0.0040) -0.0056 (0.0248)	0.0209*** (0.0064) 0.0557 (0.0374)
In public sector SE x In public sector	-0.0135** (0.0056) 0.0221 (0.0464)	-0.0239*** (0.0078) 0.0157 (0.0582)	0.0035 (0.0077) 0.0275 (0.0738)
Tenure – mean(tenure) SE x [Tenure – mean(tenure)] (Tenure – mean(tenure))^2*100 SE x [(Tenure – mean(tenure))^2]*100	0.0013*** (0.0004) 0.0037** (0.0019) -0.0130*** (0.0018) -0.0161* (0.0094)	0.0011** (0.0005) 0.0046** (0.0021) -0.0001*** (0.0000) -0.0002* (0.0001)	0.0012 (0.0009) 0.0022 (0.0039) -0.0002*** (0.0000) -0.0001 (0.0002)
Working time – mean(working time) SE x [Working time – mean(working time)]	0.0042*** (0.0002) -0.0010* (0.0006)	0.0041*** (0.0002) -0.0010 (0.0006)	0.0042*** (0.0004) -0.0010 (0.0013)
Industry Manufacturing Construction Trade Finance Services SE x Manufacturing SE x Construction SE x Trade SE x Finance SE x Services	 0.0360*** (0.0056) 0.0590*** (0.0081) --- *reference* --- 0.0276*** (0.0085) -0.0066 (0.0077) -0.0075 (0.0273) -0.0253 (0.0315) --- *reference* --- 0.0256 (0.0313) 0.0034 (0.0348)	 0.0376*** (0.0065) 0.0552*** (0.0092) --- 0.0311*** (0.0111) -0.0160 (0.0099) 0.0194 (0.0307) -0.0086 (0.0345) --- 0.0248 (0.0367) 0.0103 (0.0429)	 0.0506*** (0.0113) 0.0369** (0.0174) --- 0.0241* (0.0134) 0.0119 (0.0125) -0.0944 (0.0612) 0.0624 (0.1000) --- -0.0463 (0.0607) -0.0459 (0.0574)
Intercept	7.8390*** (0.0214)	7.9208*** (0.0273)	7.6489*** (0.0321)
R^2 Overall Within Between	0.2164 0.2044 0.2321	0.2357 0.2045 0.2769	0.1159 0.2187 0.1037
Observations (Persons)	135,330 (20,793)	91,692 (12,686)	43,638 (8,107)

Figure 3.3: Median monthly earnings – Germans vs. foreigners

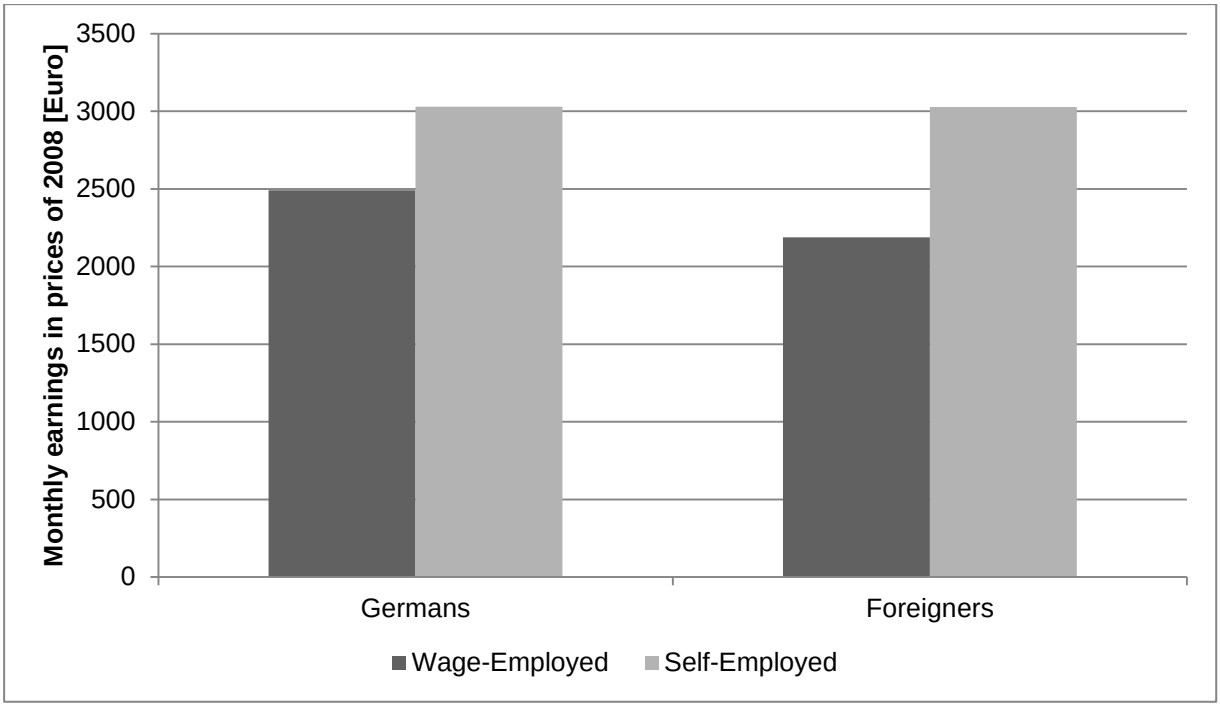

Table 3.8: Self-employment status and earnings increases – Germans vs. foreigners

	Switch SE → WE t-1=SE, t=WE	**Switch WE → SE t-1=WE, t=SE**
Germans	-0.019 (n=445)	+0.065 (n=594)
Foreigners	-0.133 (n=53)	+0.350 (n=91)

Table 3.9: Mincer regressions – Germans vs. foreigners

		Fixed effects, dependent variable: log(monthly earnings in euro of prices of 2008)	
		Effect for Germans (1)	Effect for Foreigners (2)
Self-employed (SE)		0.0917** (0.0384)	0.2709*** (0.0515)
Foreigner SE x Foreigner		0.0298* (0.0172) 0.1792*** (0.0428)	
German SE x German			-0.0298* (0.0172) -0.1792*** (0.0428)
R^2	Overall Within Between	0.2164 0.2044 0.2321	
Observations (Persons)		135,330 (20,793)	

Notes: Robust standard errors in parentheses. The models are in all other respects identical to model (4) of Table 3.4.

Furthermore, studies with regard to the German labor market often restrict their analyzes on West Germany. It is argued that the transformation process of the *East German workforce* after the German reunification in 1990, that is, the adaption of a market economy, could bias the results. As shown in Table 3.9, a regression based only on West Germans leads to an effect of self-employment of 15.0 percent. In contrast to this, the estimation for East German workers leads to a significant and negative effect of -14.8 percent. The effect is in particular strong directly after the German reunification in 1990 and shrinks over time. This is an indication that there are indeed some adaption processes among the East German workers.

Table 3.10: Mincer regressions – West vs. East Germany

		Fixed effects, dependent variable: log(monthly earnings in euro of prices of 2008)				
		West (1)	East (2)	East 90-95 (3)	East 96-00 (4)	East 01-08 (5)
Self-employed		0.1398*** (0.0435)	-0.1598* (0.0825)	-0.5342** (0.2414)	-0.1552 (0.1529)	-0.0833 (0.1154)
R^2	Overall	0.2037	0.3151	0.4591	0.0566	0.0538
	Within	0.2419	0.0564	0.0139	0.0809	0.2910
	Between	0.2233	0.0777	0.0320	0.0605	0.2416
Observations (Persons)		105,454 (16,125)	29,876 (4,979)	8,368 (2,662)	8,184 (2,986)	13,324 (3,192)

Notes: Robust standard errors in parentheses. The models are in all other respects identical to model (4) of Table 3.4.

Finally, German tax law differentiates between two forms of self-employed workers. On the one hand, there are the *liberal professions* as pharmacists, lawyers, or business consultants. Those require specific formal qualifications, such as a certain university degree. Hence, those individuals should have been learnt specific knowledge and skills for their entrepreneurial job during their education. Furthermore, the job prior to their self-employment is supposed to have the character of a side job as their occupational aim is to get into a liberal profession. Hence, the measured increase in income as a result of the switch from one job to another is bigger. About one quarter of all self-employed in the data is in a liberal profession. On the other hand, the remaining self-employed should be more heterogeneous with respect to their level of specifically entrepreneurial education. We can therefore expect that the impact on earnings should be higher for switches into liberal professions. The results presented in Table 3.11 support this assumption: When we compare switches from wage-employment into liberal professions with those into other entrepreneurial occupations by conducting separate regressions with corresponding dummy variables instead of the *SE* dummy, we receive considerably higher effects in the trade (20.2 vs. 9.6 percent) and the finance industry (17.9 vs. 6.6 per-

cent). In the services industry, the coefficients for both kinds of self-employment are not significant. In the manufacturing area, the effect for liberal professions is not significant, but higher. Only in the construction industry, the results are inverted. In conclusion, workers benefit in particular when they switch into a liberal profession. However, entrepreneurial occupations in other fields are also connected with significantly higher earnings than in wage-employment.

Table 3.11: Earnings effects of liberal professions vs. other self-employed jobs

	Fixed effects, dependent variable: log(monthly earnings in euro of prices of 2008)	
	Liberal professions	Other self-employed jobs
Manufacturing	0.1171 (0.0873)	0.0939** (0.0393)
Construction	0.0398 (0.0868)	0.1703*** (0.0457)
Trade	0.1843** (0.0766)	0.0919** (0.0416)
Finance	0.1643** (0.0692)	0.0641 (0.0412)
Services	0.1085 (0.0779)	0.0702 (0.0483)

Notes: Robust standard errors in parentheses. The models are in all other respects identical to model (4) of Table 3.4. The coefficients are those of the respective dummys for “liberal professions” and “other self-employed jobs”.

3.6 Summary and Discussion

Using GSOEP data from 1984 to 2008, earnings differences between wage-employed and self-employed workers are analyzed. To allow for different earnings effects in both kind of jobs, all other determinants are interacted with the self-employment dummy. As the income is also influenced by other unobservable effects, a fixed-effects estimator is conducted which also captures some selection effects with respect to the entry into self-employment. In fact, the analysis shows that unobservable characteristics play an important role in determining earnings of self-employed people. Altogether, the results allow for the statement that there is clear evidence for a positive influence of self-employment on earnings in Germany. In some industries, this effect is already visible in the short run, that is, directly after the switch into self-employment. The effect on income is even bigger when taking into account that workers usually work longer when they are self-employed.

There are two limitations which have to be kept in mind when we interpret the results. First, it is difficult to state which theoretical effect of those discussed in chapter 2 influences the results the most. Costs of investments in (human) capital that should emerge especially at the beginning of a business do not seem to be relevant as the income increases right after becom-

ing self-employed. However, statements with respect to non-monetary rewards, to the role of self-employment income as a risk premium or to the impact of saved agency costs are not possible. Second, the GSOEP data includes possibly ambiguous self-employment earnings as they are self-reported by the entrepreneurs. This could foster problems in terms of a mixture of capital and labor earnings or due to different ways of saving for retirement. However, as there are also arguments for an underreporting of earnings by the self-employed, it is not straightforward if there is a systematic bias in the earnings variable.

Results suggest that not all people benefit financially to an equal extent from a switch into self-employment: Workers in East Germany denote a significant decrease in their income. The switch into a liberal profession is connected with a higher income premium than in another entrepreneurial occupation. Men benefit more from self-employment than women. One possible explanation for these differences could be heterogeneous motivations for entrepreneurship. In the following, different motivations between women and men are discussed as an example.

On average, women do not benefit from the entry into an entrepreneurial occupation. Georgellis & Wall (2005) find that men are more responsive to income differences between a job in wage-employment and self-employment and they focus more on possible liquidity constraints when being an entrepreneur. Their results suggest that "women find self-employment more desirable than do men because of its greater time-flexibility and other non-pecuniary aspects" (Georgellis & Wall, 2005, p. 337), which is similar to the arguments illustrated in section 3.3. Furthermore, prior research showed that women are more often necessity entrepreneurs than men (see Bergmann & Sternberg (2007) and Wagner (2005) for descriptive results). The distinction of self-employed people in necessity and opportunity entrepreneurs has become quite popular. While the former indicate people that enter the self-employment sector due to the lack of other opportunities, the latter are people who move into self-employment because of unique opportunities (Reynolds, Camp, Bygrave, Autio & Hay, 2001). The entrepreneurship literature suggests that these two groups benefit differently from becoming self-employed. It seems likely that the increase in earnings of opportunity entrepreneurs is larger than that of necessity entrepreneurs as they obtain significantly higher rewards (see Block & Wagner (2010) for a detailed analysis of income differences between those two groups). Unfortunately, the GSOEP data does not provide explicit information about this categorization of self-employed workers. However, information about how the last job was ter-

minated can be used. The answer categories of this variable, though, are ambiguous (for 2001, only 58.9 percent of job switchers can unambiguously be categorized, see (Block & Wagner, 2010)). In consequence, there are only few entrepreneurs with complete information which makes it difficult to identify significant effects compared to wage-employed workers. Therefore, it is a future task to differentiate the group of self-employed people with more appropriate data, especially with respect to different motivations for the switch from wage-employment to self-employment.

Obviously, the results for Germany differ widely from those for the US. In the following, possible explanations will be discussed. The literature provides some evidence that the culture of self-employment in the US is different compared to Europe and especially to Germany as the barriers of becoming self-employed seem to be lower in the US. One possible barrier are opportunity costs: When German workers leave wage-employment, they also leave the rather extensive social security system of statutory pension insurance, unemployment insurance and health insurance in most cases. In contrast, social security benefits are considerably lower in the US. Another barrier could be social and cultural norms which encourage people to start a new business and increase their personal wealth. In the 2010 Report of the Global Entrepreneurship Monitor (GEM), experts were asked about the most positive and most negative factors influencing the national degree of entrepreneurship in different countries. While these norms are seen as one of the most positive factors in the US, they are one of most negative in Germany (Kelley, Bosma & Amorós, 2011, pp. 46-47). In addition to these external factors, there is also evidence that US and German workers differ with respect to their subjective perceptions. Köllinger, Minniti & Schade (2007) find that considerably more US workers see themselves capable of setting up an own company, while German workers face a higher fear of failure when they ponder the idea of establishing their own firm. The authors can show that these differences in subjective perceptions explain huge parts of country-specific differences in the probability of being both a nascent entrepreneur or an established entrepreneur.

The existence of these barriers leads to the conclusion that there should be more entrepreneurs in the US. Grilo & Thurik (2005) and Gohmann (2010) show that the rate of latent entrepreneurship is considerably higher in the US. Latent entrepreneurs are workers that prefer being self-employed to being an employee. The effect is also significant when controlling for other factors influencing the probability of preferring self-employment like socio-demographic characteristics or the individual risk tolerance. The results for actual entrepreneurship are

comparable: In the US, more workers are self-employed (Gohmann, 2010). Consequently, German workers who get over the described barriers and switch into self-employment should be more successful in an entrepreneurial occupation as their US counterparts. They are willing to take the risk of failure only if they are rather sure about the success in terms of monetary rewards, for instance. The results of Grilo & Thurik (2008) deliver some indications for this assumption. Using a multinomial model, they find that the probability of having an own early-stage business (less than three years old) instead of never having thought about self-employment is higher in the US than in Germany. The opposite is true for businesses that are well-established (more than three years old). Hence, it seems to be that workers in Germany think more about the decision on becoming self-employed than US workers do. In consequence, those who actually move into self-employment should have felt more certain about the success of their business prior to the decision. Therefore, it is not surprising that German entrepreneurs benefit from income increases on average.

In conclusion, entrepreneurial income compared to earnings from wage-employment should remain in focus. Future empirical research should investigate more profoundly the revealed international differences, preferably by means of a joint dataset of US and European respectively German workers.

4 Monetary Reference Points of Managers[17]

4.1 Introduction

In neoclassical economic theory, it is assumed that individuals solely care for their own outcomes, for instance for their wages. In contrast, behavioral personnel economists argue that individuals also consider certain reference points when evaluating their income. Employee´s utility is hence not only dependent on absolute income level alone, but also on the relative value. Two possible reference points which are widely discussed in the literature are the own hitherto status quo (i.e. the most recent income level) and the income of peers. If the two types of reference points matter, individuals acting in a role as an employee may then take their own wage of the previous period or the wage of other employees into consideration in order to determine the utility of their own current income.

Previous studies on this topic analyze only one possible reference point (either the previous status quo or social comparisons) and only one measure of monetary outcome (fixed salaries, bonus, total compensation), making it impossible to evaluate the relative relevance of the two concepts. The dataset used in this chapter, however, allows for just that. Similar to other contributions, self-assessed job satisfaction is used as a proxy measure of the utility gained from work. The following questions are addressed in particular:

(1) To what extent is job satisfaction affected by deviations from the hitherto compensation (status quo) and by the difference between one´s wage and the wages of his or her co-workers (social comparison)?

(2) Are there differences between comparisons on the firm level and on the industry level regarding the relevance of social comparisons?

(3) Are there differences between wage components in that the effects of reference points violations with respect to bonuses are different compared to those with respect to fixed salaries?

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[17] This chapter is based on joint work with Christian Grund. Valuable comments of the participants of the "15th IZA Summer School in Labor Economics" in Buch am Ammersee are gratefully acknowledged. It will be also presented at the "XIII. Symposium zur ökonomischen Analyse der Unternehmung 2012" in Graz.

For the investigation of these research questions, a unique panel dataset with rich information on income components, work situation, and socio-demographics of managers of the German chemical sector is used. Employees in management positions are of big interest in regard to the research questions as firms pay them rather high wages in order to set monetary incentives. Moreover, there is a larger income inequality among executives and managers in comparison to normal employees as a result of a higher relevance of tournament wages or bonus payments which are dependent on individual performance. The dataset has a longitudinal structure so that the relevance of possible deviations of the hitherto status quo can be explored. Moreover, the data includes information about the firm and the hierarchical level of managers and, thus, allows for defining reference groups that managers are supposed to compare their income to. It is hereby distinguished between the market level and the firm level: Ex ante it is not clear, whether employees compare themselves to colleagues at the same firm or also to employees in similar jobs at other firms. Evidence may differ across wage components, too. Therefore, a separate examination for total compensation as well as for fixed salaries and bonus payments is conducted.

The remainder of the chapter is structured as follows: In subchapter 4.2, relevant theoretical approaches are described. Afterwards, section 4.3 gives an overview of the existing empirical literature. The data and the variables are described in subchapter 4.4, followed by the methodology in section 4.5. The empirical results are presented in 4.6 and will be summarized and discussed in section 4.7.

4.2 Theoretical Approaches

Income comparisons has ever since played a minor role in the economic literature (see Drakopoulos (2011) for an overview of the history of earnings comparisons in economics). However, there are several theoretical approaches that deal with these income comparisons. They partly originate from other social sciences, but are nowadays also established in behavioural economics.

As already mentioned, the relative income should be of great importance in regard to the resulting level of utility. However, one should also assume that, consistent with a traditional economic view, the absolute wage has a positive impact on utility as well.

In general, the connection between utility and income can be described by

$$U_i = f(w_i, w^{ref}) \tag{4.1}$$

$$with\ \frac{\partial U_i}{\partial w_i} > 0\ and\ \frac{\partial U_i}{\partial w^{ref}} \gtrless 0.$$

so that the utility is a function of both the current income and a certain reference income. While the influence of the current income is supposed to be positive in all cases, the connection between utility and the reference income seems less straightforward. In the following, several theoretical arguments will be illustrated.

4.2.1 Status Quo Preferences

First theoretical foundations of the own hitherto status quo as reference point trace back to Markowitz (1952). He focused on investment strategies under risk and argued that the strategies are dependent on present wealth as well as previous individual gains and losses: Previous losses lead to a more conservative behaviour, whereas previous gains foster riskier investments. The Prospect Theory (Kahneman & Tversky, 1979; Tversky & Kahneman, 1991) enhanced this approach: Individuals evaluate a specific amount of money or other goods not only with respect to their absolute values, but also relative to a certain reference point. In this context, it is assumed that negative deviations from this reference point lead to a higher increment of disutility than positive deviations in the same magnitude lead to an increment of utility. This phenomenon is called loss aversion. With respect to status quo preferences, we should observe a negative effect on job satisfaction for employees faced with a wage decrease that is more pronounced than the positive effect of a wage increase.

On the macroeconomic level, the famous Easterlin paradox states that economic growth with respect to the GDP does not improve compulsorily the average degree of happiness of a population (Easterlin, 1974). He explains it by increased aspiration levels that go along with in-

come raises and undermine the positive effect of more income itself.[18] Although his argumentation is on entire economies, one can also apply it to individuals and conclude that positive wage increases will not automatically entail positive effects on satisfaction. Hence, it is ex ante not clear whether income increases (= positive deviations from the hitherto status quo) lead to a higher job satisfaction.

4.2.2 Social Comparisons

In the context of social comparisons, Duesenberry (1949) as one of the first scholars described the importance of the social network of individuals for their decisions on consumption. He argued that individuals experience a feeling of relative deprivation when their neighbours own better cars or their friends live in bigger apartments. As a result, they also increase their expenditures to "keep up with the Joneses". The Social Comparison Theory of Festinger (1954) and the Equity Theory of Adams (1963) are more focused on labor market situations. It is thereby argued that individuals compare themselves to similar persons (neighbours or colleagues, for instance). More precisely, Equity Theory states that employees compare their own relation of their perceived inputs and their perceived outputs to that of their peers. Inputs can be the (perceived) efforts expended on their jobs or their skills and knowledge. Outputs are the rewards employees receive for their inputs. Rewards can take on all forms of monetary compensation, but can also be of the non-monetary nature such as the appreciation by a supervisor, for instance. A perceived inequity between the own input-output relation and that of their peers should affect the behaviour of employees: They might modify their own inputs (work more or less, for example), try to modify the inputs of their colleagues (e.g. sabotage them), try to modify their outcomes (ask for a wage increase, for instance), or finally quit their job. The fair wage-effort hypothesis proposed by Akerlof (1984) and Akerlof & Yellen (1990) is based on Equity Theory: When the received wage falls below a certain wage which

[18] The Easterlin paradox, however, has faced its fair share of criticism, see for example Stevenson & Wolfers (2008) for a comprehensive analysis. In contrast, in a recent contribution on the China case Easterlin, Morgan, Switek & Wang (2012) present evidence that the average happiness level in China did not rise from 1990 until 2010 – even though the consumption per capita quadrupled during this time span. They explain their findings with the growing income inequality and the increased rate of unemployment which counteracts the positive effects of higher incomes for some parts of the Chinese population.

is considered as fair, employees withdraw their effort. The level of the fair wage is hereby the result of the comparison of own inputs and outcomes to those of the peers.

In general, these approaches assume that individuals are averse to inequality. Based on experimental evidence, Fehr & Schmidt (1999) as well as Bolton & Ockenfels (2000) offer specific utility functions, which take this inequality aversion into account and predict a negative effect on utility. They distinguish between advantageous (i.e. $w_i > w^{ref}$) and disadvantageous (i.e. $w_i < w^{ref}$) inequality. However, it seems reasonable to assume that the utility-diminishing effect of negative inequality is stronger than that of positive inequality. This idea is then quite similar to the idea of loss aversion as individuals fear to feel some kind of a "social loss".

However, Hirschman & Rothschild (1973) present an argument in favor of a positive effect caused by a reference wage which is higher than the own income. They describe an information effect[19], i.e. higher wages of others, serving as reference points. They could be interpreted as a signal for the future wage of the person in question. This effect, though, requires a realistic option that employees can at some point earn as much as their colleagues.

Besides these considerations with respect to disadvantageous situations, there are also theoretical considerations regarding the consequences of advantageous conditions. Frank (1985) argues that individuals have certain status preferences as they gain a benefit from obtaining a higher status than people in their peer group. Thereby, a higher status can be expressed by a better job or a higher wage. On the other hand, employees receiving a higher income than their peers might also feel regret or compassion towards the others so that their own utility is diminished.

Table 4.1 gives an overview of the possible effects of social comparisons on utility. Ex ante, however, it is unclear whether the positive or the negative effect will occur. It is also conceivable that both effects arise at the same time, possibly cancelling each other out. Moreover, there are no hints that the effects in disadvantageous situations are bigger compared to those

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[19] Hirschman & Rothschild call it a *tunnel effect*: "Suppose that I drive through a two-lane tunnel, both lanes going in the same direction, and run into a serious traffic jam (…) After a while the cars in the right lane begin to move. Naturally, my spirits lift considerably, for I know that the jam has been broken and that my lane's turn to move will surely come any moment now. Even though I still sit still, I feel much better off than before because of the expectation that I shall soon be on the move." (Hirschman & Rothschild, 1973, p. 545)

in advantageous situations which is important especially from a firm´s perspective. Hence, it remains an empirical question to investigate the relevance of the effects as described above.

Table 4.1: Possible utility effects of social comparisons

	Effect on utility	
Relative wage	*Positive*	*Negative*
$w_i > w^{ref}$	Status effect	Regret/Compassion
$w_i < w^{ref}$	Relative deprivation = social loss	Information effect

4.3 Literature Review

Previous empirical contributions either focus on the status quo *or* social comparisons of individuals. Some papers examine the impact on human behaviour in terms of effort, performance, quit behaviour, or labor supply, see for instance Camerer, Babcock, Loewenstein & Thaler (1997), Farber (2005), Farber (2008), Ockenfels, Sliwka & Werner (2010), Crawford & Meng (2011), or Pfeifer & Schneck (2012). Other papers analyze in a more direct approach, whether monetary reference points affect subjective well-being or job satisfaction. These contributions are described in greater detail in the following.

4.3.1 Status Quo Preferences

One strand of the literature focuses on the previous status quo as a possible reference point. However, the existing literature is rather scarce. Clark (1999) analyzes employee data of two waves of the British Household Panel Survey (BHPS). In his cross-sectional investigation, he finds a strong positive correlation between the change in hourly pay and job satisfaction. Grund & Sliwka (2007) confirm this finding with panel data of 19 waves of the German Socio-Economic Panel (GSOEP). The results are true for highly skilled white-collar workers in particular.

4.3.2 Social Comparisons

Other contributions analyze the relevance of social comparisons, i.e. the comparison to peers. In this context, Clark & Senik (2010) found evidence that colleagues are the most important group of reference persons. However, other studies stick to comparisons in different directions. The research approach thereby varies across studies. The seminal paper of Clark & Oswald (1996) makes use of the 1991 wave of the BHPS. In order to calculate the reference wage, they estimate a Mincer-type wage regression with several wage determinants and predict the expected wage for all individuals. In this case, the reference point indicates the average wage an employee with given individual and firm characteristics can expect on the labor market. They find a significantly negative correlation between job satisfaction and this reference point, controlled for the own wage.

Ferrer-i-Carbonell (2005) defines the reference point as the average income of individuals living in the same region with the same education and the same age. She uses panel data of the GSOEP from 1992 to 1997 showing that the more individuals earn in comparison to their reference group, the more satisfied they are. This effect is asymmetric, which means that individuals with an income below the reference point are more dissatisfied than individuals with an income above the reference point (in the same amount) are satisfied.

A similar result show the analyses of Luttmer (2005). He uses data of the US-American National Survey of Families and Households (NSFH) from 1987-1988 and 1992-1994 whereas reference groups are defined by people with the same occupation working in the same industry and living in the same region. He finds that happiness is negatively influenced by the average reference income. The effect of an increase in the earnings of neighbours has the similar size as a similarly sized decrease in own income.

Clark, Kristensen & Westergård-Nielsen (2009a) stick to income comparisons to the nearby neighbourhood. Using administrative data matched with eight waves of the Danish European Community Household Panel (ECHP) from 1994 to 2001, they find a positive effect of the wealth of the neighbourhood on the economic satisfaction of individuals. However, the relative position within the neighbourhood is important too: The higher individuals are located in the income distribution, the more satisfied they are.

Using GOSEP data from 2000 to 2004, Boes, Staub & Winkelmann (2010) analyze whether the own income rank and the income rank of one´s parents within a group influences income

satisfaction. The reference group is determined by region and age. They find a positive and significant effect of both the own rank and the rank of one´s parents.

FitzRoy, Nolan & Steinhardt (2011) compare the relevance of social comparisons in Germany and in Great Britain using panel data of the GSOEP and the BHPS. They define the reference group as individuals with same age, education, gender and living in the same region. Interestingly, they find an age-dependent impact of the reference income for Germany: Whereas life satisfaction is negatively correlated with the average income of the reference group for those over 45 years, this correlation is positive for those under 45 years. They interpret this finding as a confirmation of Hirschman´s tunnel effect in that individuals interpret higher wages of peers as possible signals for their own future wages. For Great Britain, the satisfaction effect of the reference income is negative for all age groups.

Some studies analyze social comparisons on the level of firms. Brown, Gardner, Oswald & Qian (2008) use data of the British Workplace Employee Relations Survey of 1998 and focus on employees. They operationalize monetary reference points by computing the individual wage rank within the firm. They find a highly significant and positive correlation of the wage rank with different measures of satisfaction. Moreover, the effect of the relative income position seems to be stronger than the effect of the absolute pay itself.

Clark, Kristensen & Westergård-Nielsen (2009b) match (as in Clark, Kristensen & Westergård-Nielsen (2009a), too) waves of the Danish ECHP with administrative data. The results show that earnings matter for job satisfaction, but so do average earnings within the establishment: The higher the mean pay in the firm, the more satisfied workers are. In this context, the authors argue that the definition of the reference group is very important for the direction of the effect. When the wages of others could be the one´s own future earnings (as in the case of higher paid co-workers), the effect is rather positive – wages exert a signal. However, when comparison earnings are not within reach, they act as an indication of a higher social status of others and the effect should be negative.

Card, Mas, Moretti & Saez (2010) conduct a field experiment with about 6,000 employees at the University of California. Within this experiment, a treatment group of employees gets information about a new website where wages of University employees are listed. Employees in the control group are not informed. They find a clear result: The information of the treatment group exerts a negative effect on the satisfaction of individuals who are paid the median

wage of their unit and occupation, i.e. workers with comparable tasks. There is no effect, however, for people who get paid above the median. One conclusion of the authors is that it could be better for employers to keep secrecy regarding the payments of their employees.

The possibly closest contribution with respect to the data used in this chapter is Ockenfels, Sliwka & Werner (2010). They compare executives of one multinational firm in two plants in Germany and the US. As they have information about the achievement of individual targets of the managers, they define the reference point as a bonus percentage of 100 percent. The bonus payment depends on to what degree managers have fulfilled their targets. Thereby, a value of 100 percent means that the manager fully meets the expectations of the supervisor. Furthermore, the bonus budget of supervisors is restricted which implies that they have to cut the payment of one or more managers if they want to pay other managers a higher bonus. In consequence, bonus percentages under the reference point could be understood as negative reference point violations. In the German plant, job satisfaction of managers is significantly reduced if they fall below the reference point, but there is no effect on satisfaction of managers with bonus percentages over 100 percent. In the United States, there is no significant effect. The authors explain this finding with the communication policy of the firm. American managers get no information about their bonus percentages, whereas German managers are entirely informed. Hence, the results of this study also suggest that firms could be better off when keeping secrecy about earnings.

In conclusion, the results imply that individuals perceive a lower utility in most cases when their wage is below a certain social reference wage. The effects of reference points, however, depend on the selection of the reference person or group. One has to criticise, however, that there is no discussion about the economic significance of income comparisons up to now.

4.4 Data and Variables

In the empirical analysis, a unique panel dataset of highly qualified professionals and executives of the German chemical industry can be used. It has been generated from a corresponding annual salary survey which was conducted at the chair for which the author works in collaboration with the German association of executive staff of the chemical industry (Verband angestellter Akademiker und leitender Angestellter der Chemischen Industrie e.V. (VAA)).

The survey is conducted in the first two months of the year among the members of the VAA.[20] According to statements of VAA officials, the sample is representative for the respective executives and managers of the chemical sector.[21] Individuals are asked about their current job next to some demographic characteristics and their previous occupational career. In particular, there is detailed information on all components of their compensation such as fixed salaries and bonus payments as well as other integral parts such as exercised stock options, inventors' gratuities or jubilee payments. Grund & Kräkel (2012) provide additional information on the data.

Four waves of this survey of the years 2009 to 2012 may be used for the empirical analysis. Compensation data are collected in retrospect so that the data covers the period from 2008 to 2011. The VAA negotiates annual collective agreements with the employers concerning minimum wage levels and working conditions. This contract is only valid for managers with a university degree in natural sciences and engineering, who account for 88 percent of the sample. Therefore, the sample is restricted to fulltime employees in West German plants who have such a university degree in natural science or engineering. Since the role of specific wage components shall be addressed – fixed salary and bonus payments in particular – only employees with a bonus contract are considered. Due to these restrictions, the sample size encompasses 14,773 observations over the four year period. There is information of about 3,700 managers each year. Individuals can be followed over time, so that the dataset has an unbalanced panel structure.

The relevance of compensation for the perceived utility from work is investigated. Therefore, reported *job satisfaction* of managers as its proxy is used (see already Freeman (1978) for the reasoning that job satisfaction is an highly relevant variable in regard to economic issues). General job satisfaction is surveyed with the question "How satisfied are you with your job?"

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[20] The VAA has about 20,000 members. Within the survey, the response rate is approximately 30 percent and is rather stable over the four years.

[21] This might not be true for managers who work in management areas as HRM or the legal department. The VAA is an organization that represents the interests of executives against their employers – similar to a union for ordinary employees. Therefore, their counterparts on the employer side such as managers in the human resources department are normally not members of the VAA. The majority of the VAA members is working in functional areas such as production, sales, or research and development.

on an 11-digit scale from 0 (totally unhappy) to 10 (totally happy).[22] The average reported job satisfaction is 6.84 with the median and mode at 8 (see Figure 4.1 and Table 4.2). The distribution does not differ very much to the whole group of employees in Germany (see Grund & Sliwka (2007) for corresponding evidence originating from representative GSOEP data).

Figure 4.1: Distribution of job satisfaction

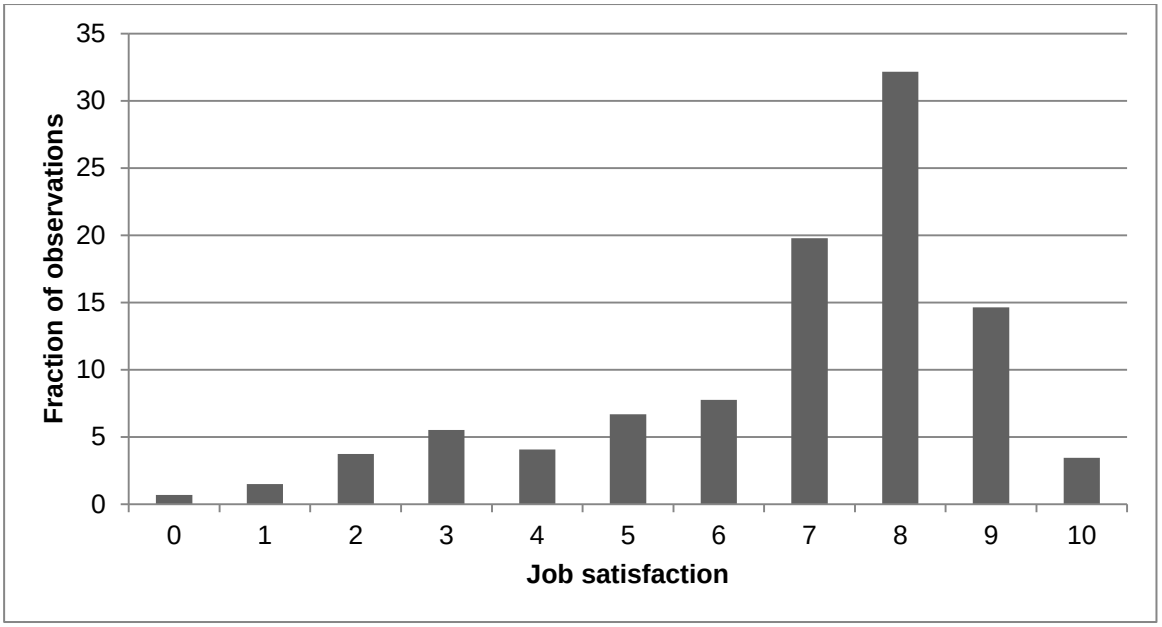
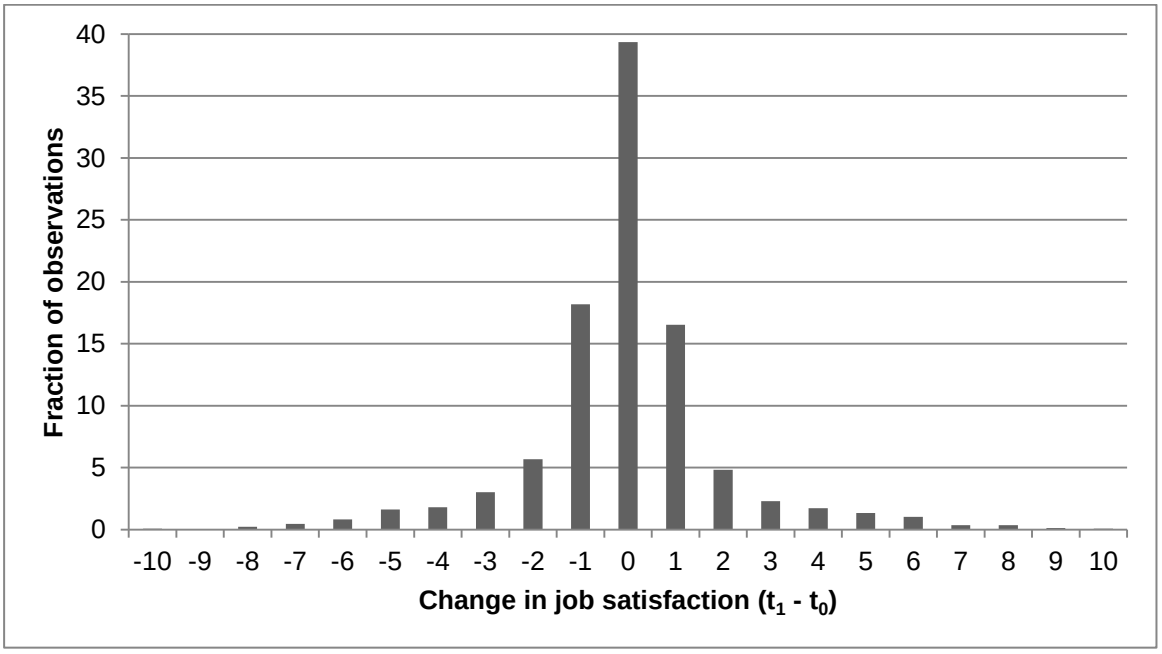


Figure 4.2: Distribution of differences in job satisfaction over time



[22] The same wording and scale is also used within the GSOEP questionnaire.

Figure 4.2 shows differences in job satisfaction over time. Most managers report a rather constant satisfaction as about only one fourth has a change of more than one satisfaction point from one year to another. Hence, it is likely that effects estimated in regressions will be rather small.

There is comprehensive information on *individuals' compensation*. Bonus payments are prevalent for managers in the chemical sector. Some employees also report other additional monetary components of compensation such as exercised stock options or gratuities for inventions in addition to their fixed salary. The average annual total compensation of the managers in the sample amounts to about 121,000 €. The main part (79 percent) of compensation is assigned to fixed salaries and 16 percent account for bonus payments (see Table 4.2). The observation period covers an economically successful year of the German chemical sector (2008) and the subsequent economic crisis in 2009 and 2010. In 2011, the industry recovered to a certain extent. The fraction of bonus payments on total compensation in the sample decreases only slightly from 17 percent in the year 2008 to 14 percent in 2010 and goes up to 18 percent in 2011.

As mentioned above, the role of *monetary reference points* next to the own compensation of the current period are explored. Therefore, reported compensation of the previous year is used as the measure for the hitherto status quo. In doing so, a considerable number of observations is lost due to missing data (in particular those of the first wave of the panel). Additionally, social comparison wages are computed by estimating cross-sectional Mincer-type wage median regressions. The results are then used to calculate predicted wages for individuals. Within the regressions, it is controlled for the level of hierarchy[23], work experience, and firm size. A manager with certain characteristics earns on average the predicted wage. These comparison wages are computed at two levels of the analysis. First, it is referred to the market level whereas all observations of the sample are included. Second, wage regressions are conducted on the firm level arguing that colleagues may be the relevant reference group. In doing so, only firms with a considerable number of observations can be considered. Therefore, the

[23] In order to have a comparable proxy of hierarchical levels across all firms in the industry, the questionnaire asks participants for a self-assessed classification in one of four different categories. Thereby, category 1 stands for the top management level and category 4 represents the lowest level of executives within the own firm.

analysis is restricted to ten large firms. More detailed information on these reference wages are given in section 4.5.2.

Table 4.2: Descriptive statistics

Variable	n	Mean	Standard deviation
Job satisfaction	14,773	6.84	2.14
Total Compensation in t (in 1,000 €)	14,773	121.33	50.54
Total Compensation in t-1 (in 1,000 €)	7,347	118.85	43.18
Fixed Salaries in t (in 1,000 €)	14,773	95.92	26.31
Fixed Salaries in t-1 (in 1,000 €)	7,347	94.72	24.39
Bonus Payments in t (in 1,000 €)	14,773	19.23	18.76
Bonus Payments in t-1 (in 1,000 €)	7,347	17.66	15.73
Female (dummy, 1=yes)	14,773	0.100	
Being in Relationship (dummy, 1=yes)	14,773	0.919	
Children in household (dummy, 1=yes)	14,773	0.662	
Distance to workplace (in km)	14,773	23.54	23.67
Tenure (in years)	14,773	15.67	8.63
Experience (in years)	14,773	21.99	7.62
Firm size (number of employees)			
≤100	545	0.037	
101-300	652	0.043	
301-1,000	1,514	0.103	
1,001-2,000	1,487	0.101	
2,001-5,000	1,879	0.127	
5,001-10,000	1,781	0.121	
10,001-30,000	3,908	0.265	
>30,000	3,007	0.204	
Hierarchical Level			
Level 1 (top management)	264	0.018	
Level 2	2,066	0.140	
Level 3	7,855	0.532	
Level 4	4,588	0.311	
Year			
2008	3,617	0.245	
2009	3,763	0.255	
2010	3,696	0.250	
2011	3.697	0.250	

The regression analysis on job satisfaction includes several control variables. These variables cover socio-demographic characteristics such as sex, being in a relationship, having children,

and experience as well as job- and firm-level factors, which include the distance from home to the workplace (in km), tenure (in years), firm size (8 dummies), and level of the hierarchy (4 dummies). Table 4.2 also offers some descriptive statistics of the control variables. Information on the operationalization of these items can be found in Table A 7 in the appendix.

4.5 Methodology

4.5.1 Status Quo Preferences

It is argued above that total compensation or certain wage components of the previous year may act as reference points in the sense of a hitherto status quo. Hereby, the role of fixed salary and bonus payments next to total monetary compensation is explored. Then the actual salary as well as deviations from the previous year may have an effect on job satisfaction

Individual reported job satisfaction in the current year acts as the dependent variable.[24] Including current wage and the wage of the previous year, the following estimation applies:

$$\text{Job satisfaction}_t = \alpha + \beta \cdot wage_t + \gamma \cdot wage_{t-1} + \delta' X + \varepsilon. \tag{4.2}$$

The vector of the other independent variables is characterized by X. A simple transformation shows that the effect of wage increases is directly captured with this approach:

$$JS_t = \alpha + (\beta + \gamma) \cdot wage_t - \gamma \cdot (wage_t - wage_{t-1}) + \delta' X + \varepsilon. \tag{4.3}$$

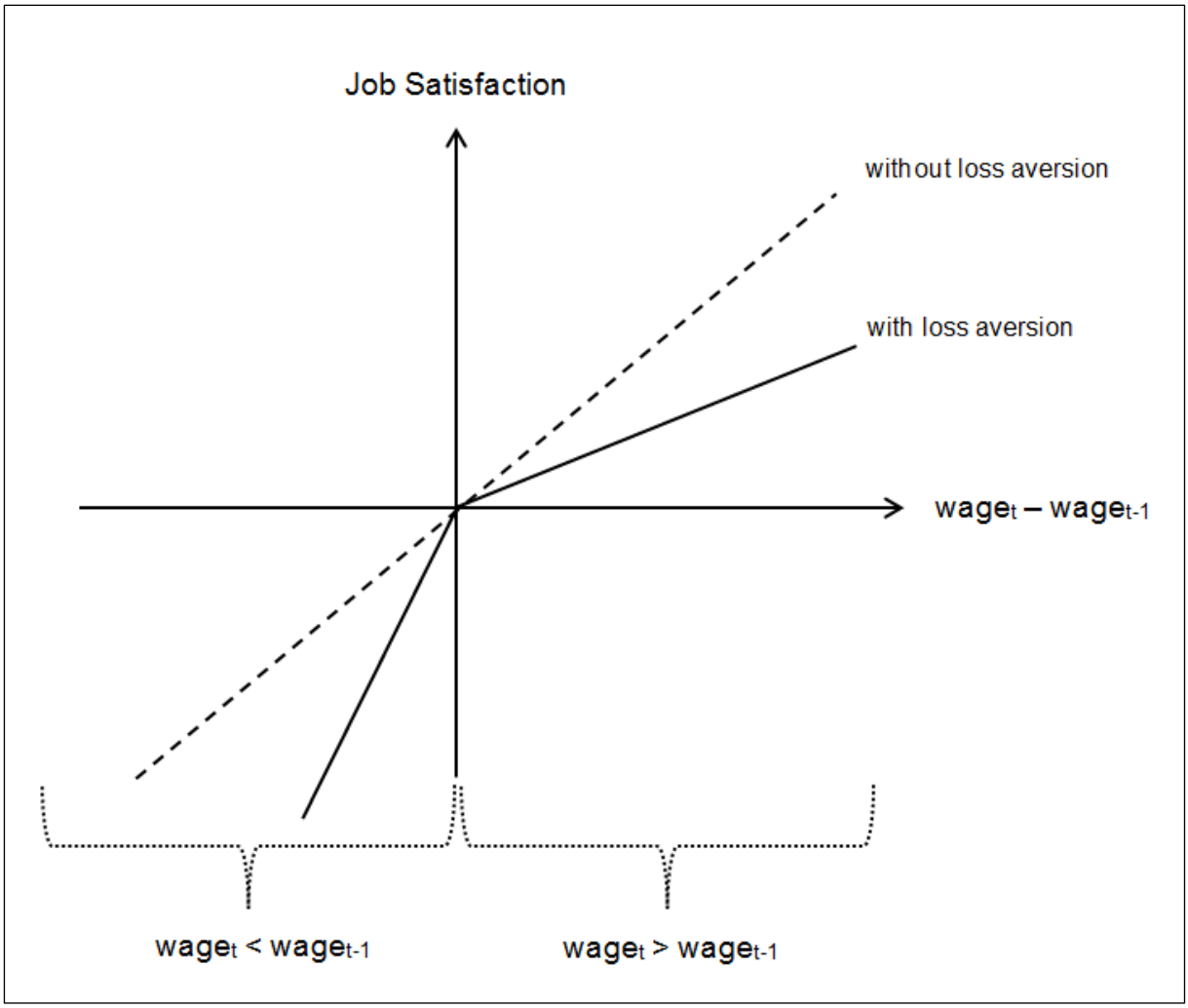
Hence, evidence for status quo preferences would be revealed by a negative and significant estimate of γ. The results of estimations of (4.2) and (4.3) are equivalent in terms of the estimated coefficients α, β, γ, and δ.

This approach is based on the assumption that the satisfaction effect of the previous status quo is equal in size for all managers, no matter whether they earn more or less than before. However, under the assumption of loss aversion, managers are supposed to evaluate wage decreas-

[24] Being more precisely, it is asked about individual job satisfaction at the time of the interview (which is in January or February in most cases). Current wages indicate the annual payments from the most recent year. Lagged wages are annual payments from one year before.

es stronger than wage increases. Figure 4.3 illustrates this consideration with two different curves. The dashed line represents the effect on job satisfaction in the absence of loss aversion which is the result of an estimation of equation (4.3). In contrast, the continuous curve with the kink in the point of origin stands for the situation under the assumption of loss aversion.

Figure 4.3: Status quo preferences and loss aversion



To test this approach econometrically, (4.3) is extended to:

$$JS_t = \alpha + \beta \cdot wage_t + \gamma \cdot (wage_t - wage_{t-1}) + \delta \cdot (wage_t - wage_{t-1}) \cdot Decrease + \eta' X + \varepsilon. \qquad (4.4)$$

Decrease represents a dummy which adopts "1" if the manager earns less than the year before. The evidence of loss aversion would be revealed by positive and significant coefficient δ, which would indicate the steeper slope of the curve below the origin in Figure 4.3 as one

has add γ and δ. Note that, due to the interaction term, the coefficients of this equation are not any longer identical to the coefficients of (4.2) and (4.3).

This approach uses absolute wage terms. However, a wage increase of 1,000 € might not exert the same effect on the utility of a manager who earns about 70,000 € a year as on the utility of a manager with an annual salary of 150,000 €. In other words: It is possible that the correlation between wages and job satisfaction is not linear. Hence, relative wage increases will also be analyzed by replacing the absolute income terms in the equations above by logarithmized wages.[25] Linear estimation models will be applied in order to get effects which can be easily interpreted.[26] To begin with, a simple OLS estimation will be used to explore differences between individuals. However, as pointed out by Ferrer-i-Carbonell & Frijters (2004), it is important to control for time-invariant heterogeneity in order to investigate potential effects on individual satisfaction.[27] Thus, panel estimators will also be applied. The main focus will be on fixed-effects models as these allow for a correlation between the unobserved factors and the independent variables. However, as proposed by Wooldridge (2006, p. 491), the coefficients of similar random-effects models will also be displayed in order to get the entire picture. Significant differences between the coefficients of the fixed-effects and the random-effects model would indicate an inconsistency of the random-effects estimation (the so-called Hausman test). Then, a fixed-effects estimator should be preferred despite its lower efficiency. One potential problem with fixed-effects models, however, is their need of a sufficient intra-personal variation in both the dependent and the independent variables in order to get significant results. In the case of insufficient variation, one can explore the differences between the managers by using OLS models, but it is difficult to make inferences with respect

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[25] When estimating models which are semi-loglinear in an independent variable, one gets the effect of a relative increase on the dependent variable: When the independent variable is increased by one percent, the dependent variable rises by approximately ß/100 units whereas ß stands for the estimated coefficient (see Table A 8 in the Appendix for an illustration). To get a coefficient which can be directly interpreted as the satisfaction effect, the logarithmized wages are divided by 100.

[26] Another possibility would be ordered probit probability models. However linear models that estimate quantitative satisfaction effects of wage increases seem to be more appropriate in the context of this study. Furthermore, models with fixed effects cannot easily be estimated in the ordered probit case (see Grund & Sliwka (2007) for a similar explanation regarding the use of linear models).

[27] In addition, they show that it is of minor importance for the analysis of determinants of satisfaction whether a ordered response model or a linear model is applied. It is more important to control for fixed effects.

to effects on satisfaction. It is likely that payments vary over time. In contrast, job satisfaction is rather stable (as shown in chapter 4.4). It has to be seen whether significant effects can nonetheless be revealed.[28]

4.5.2 Social Comparisons and Job Satisfaction

As mentioned above, the relevance of social comparisons is being investigated on two different levels. On the one hand, managers may compare themselves with the whole labor market of the chemical industry. Wages within the sector are transparent to a certain extent, as the VAA publishes an annual brochure including multiple descriptive analyses regarding the earnings of their members (based on the same dataset used in this chapter). Hence, managers should have some possibilities to compare their wages with those of others. Reference wages are thereby operationalized by the predicted wage managers would earn on average with their characteristics on the market. Mincer-type median[29] wage regressions are estimated for total compensation, fixed salary and bonus payments. As wages within the chemical sector differ considerably between the four years, separate cross-sectional regressions for each year are conducted. Within the estimations, it is controlled for firm size, work experience, and hierarchical level, as these are the most important determinants of wages within the chemical industry.[30] In consequence, the predicted wage reflects the wages executives would earn on average with their individual firm size, work experience, and hierarchical level in a given year.

Besides these social comparisons to other managers in the market, managers may also compare their wages with to salaries of their intra-firm colleagues. The operationalization of the corresponding reference wage is similar as wages are also predicted after running Mincer-type median wage regressions. However, only observations of a particular firm are included. Analogously, separate cross-sectional regressions for each of the four years are estimated. It is

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[28] Low variation could be a problem regarding some control variables, too. For example, inter-firm job mobility in the chemical sector is rather low. Moreover, climbs on the intra-firm job ladder from level 3 to 2 or even 2 to 1 are rare. Hence, we should expect no considerable satisfaction effects of the hierarchical level due to the low number of individual switches.

[29] The use of quantile regressions is preferred over linear OLS models because the median is more robust as the mean is to outliers in the sample (especially in small samples like this). However, the results do not differ considerably from when a normal linear OLS regression is used to compute the reference wages.

[30] The adjusted R^2 of equivalent OLS estimations instead of quantile regressions reaches over 60 percent.

controlled for work experience and hierarchical level. The predicted wage in this case reflects the income managers should earn on average given their work experience and hierarchical level in the firm. Therefore, the analysis focuses only on firms with sufficient observations in the single years so that only ten bigger firms are considered.

The estimation equation with the own current wage and the predicted reference wage is as follows:

$$JS_t = \alpha + \beta \cdot wage_t + \gamma \cdot wage_{ref,\,t} + \delta' X + \varepsilon. \tag{4.5}$$

A simple transformation leads to a similar equation as in the case of status quo preferences:

$$JS_t = \alpha + (\beta + \gamma) \cdot wage_t - \gamma \cdot (wage_t - wage_{ref,\,t}) + \delta' X + \varepsilon. \tag{4.6}$$

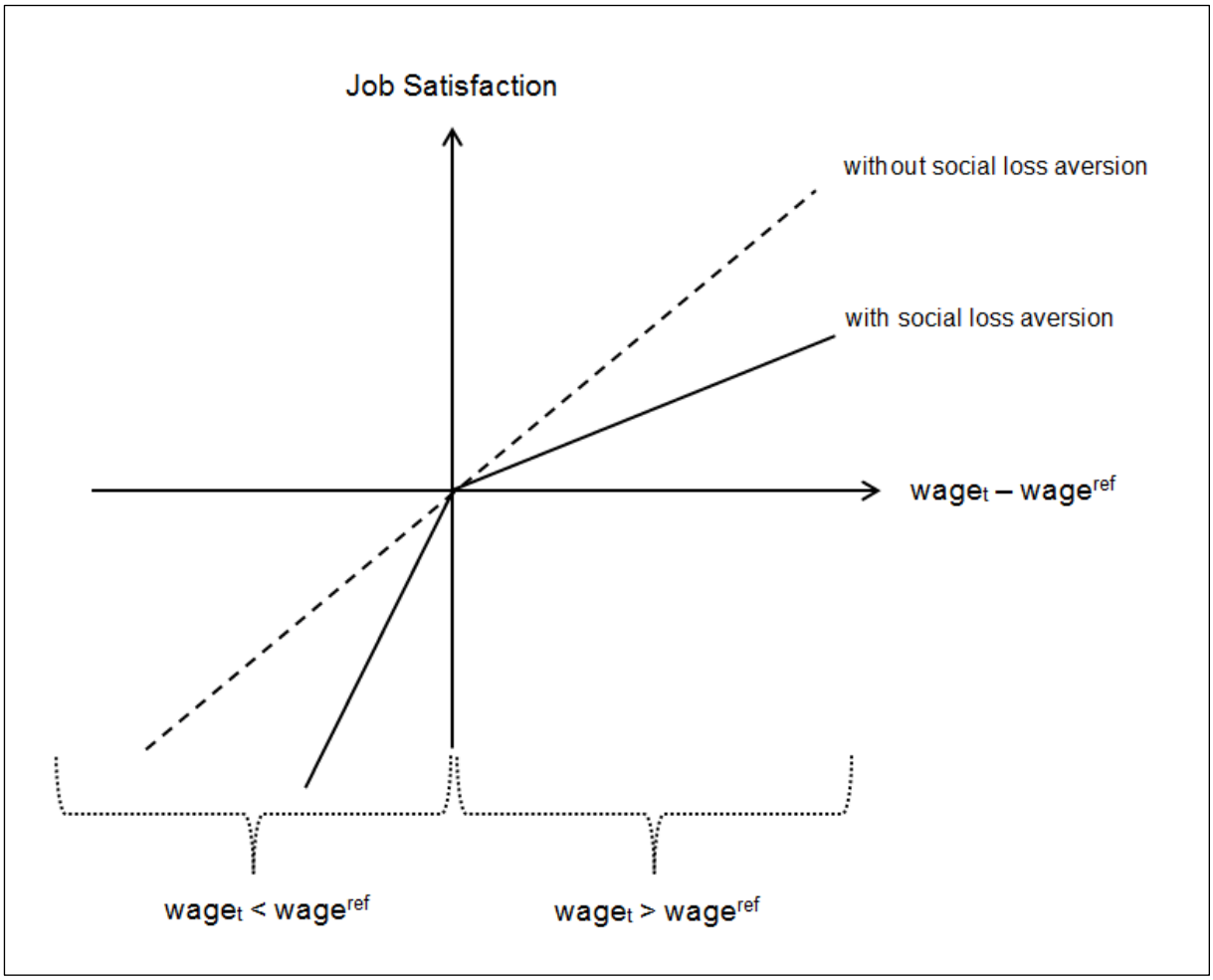
In this case, γ indicates the relevance of social comparisons. Given a significant influence, a negative sign would indicate preferences for the own wage to be higher than that of the peers. Estimations of (4.5) and (4.6) would lead to equivalent results with respect to the estimated coefficients. In all other aspects, the estimations are identical to those presented in section 4.5.1 for status quo preferences.

Similar to the situation of status quo preferences and loss aversion, there are also some hints that managers who earn less than their peer group are more influenced by the reference income than managers with an income above the reference wage (see section 4.2.2 and the illustration in Figure 4.4). This is called *social loss aversion*. To test whether there is empirical evidence for this assumption, (4.6) is extended to:

$$JS_t = \alpha + \beta \cdot wage_t + \gamma \cdot (wage_t - wage_{ref,t}) + \delta \cdot (wage_t - wage_{ref,\,t}) \cdot Below + \eta' X + \varepsilon. \tag{4.7}$$

Below is a dummy adopting “1” when the manager earns less than the respective reference income. A positive and significant coefficient δ would prove that the effect of the reference income is especially strong for managers with a wage < $wage_{ref}$.

Figure 4.4: Social comparisons and social loss aversion



Equivalent to the approach with respect to status quo preferences, the impact of relative wage differences will be analyzed next to that of absolute differences. Moreover, it will be investigated whether the individual wage rank within the reference group affects job satisfaction (see Brown, Gardner, Oswald & Qian (2008) and Boes, Staub & Winkelmann (2010) for similar approaches). The model is then described by

$$\mathrm{JS}_t = \alpha + \beta \cdot \mathrm{wage}_t + \gamma \cdot \mathrm{wage}_{rank,\,t} + \delta' X + \varepsilon. \tag{4.8}$$

The rank is the individual wage percentile within a reference group. On the market level, these groups are defined by the same firm size, the same hierarchical level, and the same cat-

egory of work experience.[31] On the firm level, they are defined by the same hierarchical level and the same category of work experience. OLS, random-effects, and fixed-effects models will then be used for the estimations.

In the following chapter, the empirical results with respect to monetary reference points of managers will be presented.

4.6 Empirical Results

The chapter is structured as follows: First, the relevance of status quo preferences is investigated. Then, social comparisons on the market level and on the firm level are explored.

4.6.1 Relevance of Status Quo Preferences

First, deviations from the own previous status quo (= wage increases/decreases) are investigated. Table 4.3 presents the results for absolute wage differences, whereas models (1) to (3) show the OLS, RE, and FE estimations for total compensation and models (4) to (6) those for fixed salaries and bonus payments as separate regressors.[32] The models are based on roughly 7,000 observations since wage information on the previous year had to be available for an observation to be included. Because of that, in particular all observations of the first wave are lost (except for their wage information). In the cross-sectional analysis, current payments (total compensation, fixed salaries, and bonus payments) are significant which indicates that the satisfaction of managers increases in their wages. However, this result does not hold when it is controlled for unobserved heterogeneity within the fixed-effects model. This indicates that managers who receive a higher wage also report a higher level of job satisfaction, which is due to other differences that cannot be observed and are not a result of the income premium. When we turn to the past payments, a negative and significant coefficient would indicate sta-

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[31] Due to the sample size, it is not possible to consider managers with exactly the same number of years of work experience as reference peers since the groups would become too small. Because of that, work experience is divided into eight categories: 1-5 years, 6-10 years, 11-15 years, 16-20 years, 21-25 years, 26-30 years, 31-35 years, and over 35 years.

[32] These models embrace variables for both fixed salaries and bonus payments in each case. As both wage components are highly correlated, separate models for fixed salaries and for bonus payments would lead to biased results with respect to the coefficients of the wage variables.

tus quo preferences (as described in chapter 4.5.1), but we do not see any significant results (except for fixed salaries in the OLS estimation), meaning that there is no evidence for a linear correlation or even causality between job satisfaction and absolute wage increase. In addition, the effect sizes are rather small. The coefficient of total compensation in the OLS model, for instance, indicates that managers earning 1,000 € more than others report ceteris paribus a satisfaction score which is only 0.0038 points higher. In other words: One point of job satisfaction is about 263,000 € "worth".

The coefficients of the random-effects models differ significantly from the fixed-effects model so that we can assume that the unobserved factors are correlated with the other independent variables. Hence, the fixed-effects models should be preferred. Having a look at the control variables, we see a negative influence of tenure. Managers on level 3 are more satisfied than those on level 4. Surprisingly, a prolonged distance to work leads to a higher satisfaction.[33] All other controls do not exert an influence on satisfaction which is supposed to be at least partly due to small individual variation over time (as mentioned in chapter 4.5.1). The explanatory power of the models is rather low shown by small R^2 values. This should not be a major problem for interpreting the coefficients as long as there are no important other (unobservable) factors which are correlated with the wage variables. If this is the case, the wage effects would be biased. However, there are no hints towards the potential existence of such factors.

The connection between job satisfaction and relative wage differences is illustrated in Table 4.4. Note that about 700 observations are lost due to zero bonus payments which cannot be transformed by the logarithm function. Most results are similar to those of Table 4.3. However, the effect of the bonus of the previous year is now significant with a surprisingly positive sign.

It is argued in chapters 4.3.1 and 4.5.1 that loss aversion could be relevant in the context of status quo preferences as individuals perceive an extraordinarily high disutility of earning less

[33] One can assume that this is not the true causality. It could be that the increase in the distance to the workplace is a proxy for an individual employer change. If this is the case, the positive effect should rather be due to other improvements that came along with the change. The cross-sectional analyses support this hypothesis as managers with a longer distance to their workplace report significantly lower satisfaction scores. However, there is no direct information about employer changes in the data. One may apply an indirect approach by looking at managers with a tenure ≤ 1 year. These are only 108 observations (0.7 percent). Therefore, it is abstained from a more detailed investigation.

than the year before. One may then expect a positive coefficient of the interaction between the wage difference and the *Decrease* dummy. The results are shown in Table 4.5 (absolute differences) and Table 4.6 (relative differences), however, do not indicate that this is really the case. Even with significant coefficients for fixed salaries and bonus payments in the OLS model of relative differences, the result does not hold when it is controlled for unobserved heterogeneity within the fixed-effects estimation.

To sum up, there is no evidence for the relevance of status quo preferences of managers. Only the current wage exerts a positive influence on job satisfaction, but this effect is rather low.

Table 4.3: Comparisons with the hitherto status quo (absolute differences)

	Dependent variable: job satisfaction					
	(1) Total OLS	(2) Total RE	(3) Total FE	(4) Fixed/Bonus OLS	(5) Fix/Bonus RE	(6) Fix/Bonus FE
Total Compensation$_t$	0.0038*** (0.0011)	0.0029*** (0.0009)	0.0009 (0.0012)			
Total Compensation$_{t-1}$	-0.0010 (0.0013)	0.0003 (0.0011)	-0.0007 (0.0018)			
Fixed Salary$_t$				0.0120*** (0.0039)	0.0082** (0.0036)	0.0043 (0.0067)
Fixed Salary$_{t-1}$				-0.0082** (0.0040)	-0.0051 (0.0036)	-0.0040 (0.0050)
Bonus$_t$				0.0079*** (0.0026)	0.0059*** (0.0022)	0.0038 (0.0032)
Bonus Payment$_{t-1}$				-0.0021 (0.0026)	0.0025 (0.0022)	0.0056 (0.0036)
Female (dummy)	-0.0085 (0.0913)	-0.0272 (0.1113)		-0.0024 (0.0916)	-0.0242 (0.1116)	
In Relationship (dummy)	0.2032** (0.1006)	0.2324** (0.1135)	-0.0255 (0.2199)	0.1898* (0.1002)	0.2216* (0.1131)	-0.0281 (0.2187)
Children in Household (1=yes)	0.0056 (0.0602)	-0.0158 (0.0686)	-0.1689 (0.1611)	0.0040 (0.0601)	-0.0194 (0.0686)	-0.1794 (0.1613)
Distance to workplace (in km)	-0.0036*** (0.0012)	-0.0016 (0.0013)	0.0055* (0.0030)	-0.0036*** (0.0012)	-0.0016 (0.0013)	0.0056* (0.0030)
Up to 100 employees	-0.2631 (0.1839)	-0.3507 (0.2337)	-0.2810 (0.8106)	-0.2270 (0.1841)	-0.3281 (0.2346)	-0.2625 (0.8132)
1-300 employees	-0.3496** (0.1692)	-0.3157 (0.2078)	0.0361 (0.4761)	-0.3256* (0.1686)	-0.2936 (0.2072)	0.0482 (0.4788)
301-1,000 employees	0.1170 (0.1118)	0.0097 (0.1258)	-0.0071 (0.2611)	0.1254 (0.1119)	0.0190 (0.1256)	-0.0035 (0.2602)
1,001-2,000 employees	---	---	---	---	---	---
2,001-5,000 employees	-0.0109 (0.1057)	-0.0119 (0.1163)	-0.0130 (0.2187)	-0.0198 (0.1057)	-0.0191 (0.1163)	-0.0114 (0.2178)
5,001-10,000 employees	-0.2019* (0.1109)	-0.1874 (0.1216)	-0.2192 (0.2391)	-0.2225** (0.1110)	-0.2077* (0.1217)	-0.2147 (0.2372)
10,001-30,000 employees	0.2560*** (0.0928)	0.2085** (0.1056)	-0.0510 (0.2432)	0.2166** (0.0939)	0.1778* (0.1066)	-0.0381 (0.2417)
At least 30,001 employees	0.4826*** (0.0968)	0.4290*** (0.1096)	0.0965 (0.2652)	0.4644*** (0.0988)	0.3957*** (0.1112)	0.1003 (0.2645)
Tenure (in years)	-0.0007 (0.0053)	-0.0045 (0.0064)	-0.0627** (0.0244)	-0.0005 (0.0053)	-0.0044 (0.0064)	-0.0616** (0.0242)
Experience (in years)	-0.0227*** (0.0061)	-0.0189*** (0.0072)	-0.0183 (0.0312)	-0.0237*** (0.0064)	-0.0194*** (0.0075)	-0.0188 (0.0312)
Level 1 (Top Management)	0.6822** (0.2730)	0.6975** (0.3292)	0.2949 (0.7344)	0.5545** (0.2754)	0.5923* (0.3270)	0.2529 (0.7299)
Level 2	0.3040*** (0.0881)	0.2885*** (0.0960)	0.1197 (0.1795)	0.2679*** (0.0882)	0.2634*** (0.0953)	0.1276 (0.1781)
Level 3	---	---	---	---	---	---
Level 4	-0.3142*** (0.0635)	-0.3167*** (0.0681)	-0.3735*** (0.1108)	-0.2783*** (0.0647)	-0.2948*** (0.0690)	-0.3770*** (0.1107)
2009	0.0189 (0.0617)	0.0040 (0.0457)	-0.0637 (0.0626)	0.0159 (0.0622)	-0.0116 (0.0467)	-0.0848 (0.0686)
2010	---	---	---	---	---	---
2011	-0.0760 (0.0620)	-0.0726 (0.0466)	0.0147 (0.0681)	-0.1071* (0.0639)	-0.0906* (0.0483)	-0.0102 (0.0755)
Constant	6.8319*** (0.1602)	6.7295*** (0.1806)	8.4096*** (0.9267)	6.7256*** (0.1845)	6.7006*** (0.2079)	8.2342*** -12236
Observations (persons)	7,031	7,031 (3,844)	7,031 (3,844)	7,031	7,031 (3,844)	7,031 (3,844)
R^2 (overall)	0.0350	0.0339	0.0016	0.0371	0.0355	0.0042

Notes: Robust standard errors in parentheses. All wages are divided by 1,000.

Table 4.4: Comparisons with the hitherto status quo (relative differences)

	Dependent variable: job satisfaction					
	(1) Total OLS	(2) Total RE	(3) Total FE	(4) Fix/Bonus OLS	(5) Fix/Bonus RE	(6) Fix/Bonus FE
Total Compensation$_t$	0.0099*** (0.0021)	0.0070*** (0.0018)	0.4315 (0.2896)			
Total Compensation$_{t-1}$	-0.0054*** (0.0021)	-0.0024 (0.0017)	0.0003 (0.0028)			
Fixed Salary$_t$				0.0085*** (0.0028)	0.0047** (0.0023)	0.0021 (0.0039)
Fixed Salary$_{t-1}$				-0.0064** (0.0026)	-0.0043** (0.0020)	-0.0024 (0.0029)
Bonus$_t$				0.0022*** (0.0006)	0.0015*** (0.0005)	0.0009 (0.0008)
Bonus Payment$_{t-1}$				-0.0001 (0.0006)	0.0009* (0.0005)	0.0016** (0.0008)
Female (dummy)	0.0342 (0.0968)	-0.0068 (0.1196)		0.0301 (0.0971)	-0.0169 (0.1198)	
In Relationship (dummy)	0.1911* (0.1077)	0.1897 (0.1185)	-0.2402 (0.2118)	0.1816* (0.1074)	0.1885 (0.1185)	-0.2346 (0.2119)
Children in Household (1=yes)	0.0180 (0.0636)	0.0142 (0.0713)	-0.1440 (0.1542)	0.0191 (0.0636)	0.0139 (0.0713)	-0.1474 (0.1537)
Distance to workplace (in km)	-0.0037*** (0.0012)	-0.0013 (0.0014)	0.0059* (0.0030)	-0.0037*** (0.0012)	-0.0013 (0.0014)	0.0059* (0.0030)
Up to 100 employees	-0.1108 (0.2173)	-0.0811 (0.2722)	0.5678 (0.9421)	-0.0606 (0.2167)	-0.0532 (0.2708)	0.6272 (0.9299)
1-300 employees	-0.1370 (0.1868)	-0.0843 (0.2133)	0.5024 (0.4239)	-0.1114 (0.1865)	-0.0679 (0.2124)	0.4848 (0.4217)
301-1,000 employees	0.1544 (0.1243)	0.0296 (0.1391)	-0.1101 (0.2769)	0.1656 (0.1244)	0.0372 (0.1390)	-0.1168 (0.2764)
1,001-2,000 employees	0.0000 (0.0000)	---	---	---	---	---
2,001-5,000 employees	-0.0293 (0.1148)	-0.0309 (0.1212)	-0.1033 (0.2063)	-0.0320 (0.1149)	-0.0297 (0.1216)	-0.0996 (0.2065)
5,001-10,000 employees	-0.2415** (0.1202)	-0.2158* (0.1275)	-0.2985 (0.2334)	-0.2669** (0.1202)	-0.2377* (0.1276)	-0.2923 (0.2316)
10,001-30,000 employees	0.2283** (0.1017)	0.1998* (0.1124)	-0.0756 (0.2374)	0.1872* (0.1025)	0.1731 (0.1132)	-0.0642 (0.2364)
At least 30,001 employees	0.4542*** (0.1051)	0.3948*** (0.1159)	0.0313 (0.2633)	0.3994*** (0.1069)	0.3368*** (0.1178)	0.0329 (0.2636)
Tenure (in years)	-0.0031 (0.0056)	-0.0068 (0.0068)	-0.0566** (0.0261)	-0.0031 (0.0056)	-0.0067 (0.0068)	-0.0554** (0.0259)
Experience (in years)	-0.0212*** (0.0066)	-0.0159** (0.0079)	0.0253 (0.0280)	-0.0207*** (0.0068)	-0.0142* (0.0080)	0.0242 (0.0282)
Level 1 (Top Management)	0.5394* (0.2979)	0.5115 (0.3328)	0.0698 (0.6576)	0.4847 (0.2960)	0.4986 (0.3290)	0.0729 (0.6492)
Level 2	0.2827*** (0.0918)	0.3128*** (0.0988)	0.3020* (0.1795)	0.2759*** (0.0896)	0.3247*** (0.0965)	0.3130* (0.1801)
Level 3	0.0000 (0.0000)	---	---	---	---	---
Level 4	-0.2826*** (0.0697)	-0.2823*** (0.0734)	-0.3606*** (0.1141)	-0.2579*** (0.0706)	-0.2749*** (0.0741)	-0.3594*** (0.1146)
2009	0.0138 (0.0643)	0.0107 (0.0474)	0.0091 (0.0627)	-0.0108 (0.0647)	-0.0189 (0.0481)	-0.0232 (0.0652)
2010	0.0000 (0.0000)	---	---	---	---	---
2011	-0.1043 (0.0656)	-0.0869* (0.0493)	-0.0662 (0.0739)	-0.1113* (0.0675)	-0.0858* (0.0501)	-0.0545 (0.0731)
Constant	1.9141 (1.5307)	1.7939 (1.6814)	2.1056 (5.3486)	2.7780 (1.9190)	4.3411** (2.1013)	5.5646 (6.9088)
Observations (persons)	6,350	6,350 (3,501)	6,350 (3,501)	6,350	6,350 (3,501)	6,350 (3,501)
R^2 (overall)	0.0342	0.0326	0.0042	0.0356	0.0336	0.0053

Notes: Robust standard errors in parentheses. All wages are divided by 1,000, then logarithmized, and again divided by 100.

Table 4.5: Status quo preferences and loss aversion (absolute differences)

	Dependent variable: job satisfaction					
	(1) Total OLS	(2) Total RE	(3) Total FE	(4) Fix/Bonus OLS	(5) Fix/Bonus RE	(6) Fix/Bonus FE
Total Compensation$_t$	0.0035*** (0.0010)	0.0032*** (0.0011)	-0.0018 (0.0027)			
Total Comp$_t$ – Total Comp$_{t-1}$	-0.0010 (0.0018)	-0.0004 (0.0017)	0.0040 (0.0028)			
(Total Comp$_t$ – Total Comp$_{t-1}$)*Decrease	0.0049 (0.0032)	0.0002 (0.0029)	-0.0063 (0.0041)			
Fixed Salary$_t$				0.0038** (0.0019)	0.0029 (0.0022)	0.0009 (0.0083)
Fixed Salary$_t$ – Fixed Salary$_{t-1}$				0.0131** (0.0053)	0.0113** (0.0048)	0.0112 (0.0074)
(Fixed Salary$_t$ – Fixed Salary$_{t-1}$)*Decrease				-0.0150 (0.0093)	-0.0183* (0.0100)	-0.0204 (0.0136)
Bonus$_t$				0.0071** (0.0031)	0.0095*** (0.0035)	0.0108 (0.0066)
Bonus$_t$ – Bonus$_{t-1}$				-0.0024 (0.0039)	-0.0056 (0.0039)	-0.0077 (0.0063)
(Bonus$_t$ – Bonus$_{t-1}$)*Decrease				0.0087 (0.0062)	0.0059 (0.0056)	0.0036 (0.0076)
Female (dummy)	-0.0064 (0.0914)	-0.0271 (0.1113)		-0.0081 (0.0917)	-0.0285 (0.1117)	
In Relationship (dummy)	0.2007** (0.1006)	0.2323** (0.1135)	-0.0284 (0.2197)	0.1894* (0.1002)	0.2197* (0.1130)	-0.0282 (0.2171)
Children in Household (1=yes)	0.0052 (0.0602)	-0.0158 (0.0686)	-0.1703 (0.1609)	0.0034 (0.0601)	-0.0191 (0.0686)	-0.1762 (0.1622)
Distance to workplace (in km)	-0.0036*** (0.0012)	-0.0016 (0.0013)	0.0055* (0.0030)	-0.0036*** (0.0012)	-0.0015 (0.0013)	0.0056* (0.0030)
Up to 100 employees	-0.2611 (0.1843)	-0.3505 (0.2339)	-0.2814 (0.8096)	-0.2323 (0.1841)	-0.3271 (0.2332)	-0.2481 (0.8027)
1-300 employees	-0.3499** (0.1691)	-0.3157 (0.2078)	0.0317 (0.4742)	-0.3349** (0.1685)	-0.2957 (0.2055)	0.0671 (0.4692)
301-1,000 employees	0.1141 (0.1117)	0.0097 (0.1258)	-0.0095 (0.2609)	0.1228 (0.1119)	0.0197 (0.1251)	0.0073 (0.2570)
1,001-2,000 employees	0.0000 (0.0000)	---	---	---	---	---
2,001-5,000 employees	-0.0161 (0.1057)	-0.0120 (0.1163)	-0.0219 (0.2184)	-0.0258 (0.1054)	-0.0210 (0.1160)	-0.0061 (0.2166)
5,001-10,000 employees	-0.2072* (0.1108)	-0.1875 (0.1216)	-0.2271 (0.2388)	-0.2288** (0.1108)	-0.2131* (0.1213)	-0.2070 (0.2354)
10,001-30,000 employees	0.2423*** (0.0930)	0.2080** (0.1058)	-0.0553 (0.2430)	0.2037** (0.0937)	0.1692 (0.1063)	-0.0267 (0.2392)
At least 30,001 employees	0.4760*** (0.0967)	0.4288*** (0.1096)	0.0891 (0.2651)	0.4588*** (0.0986)	0.3909*** (0.1108)	0.1131 (0.2618)
Tenure (in years)	-0.0010 (0.0053)	-0.0045 (0.0064)	-0.0614** (0.0244)	-0.0001 (0.0053)	-0.0037 (0.0063)	-0.0574** (0.0238)
Experience (in years)	-0.0234*** (0.0061)	-0.0189*** (0.0073)	-0.0186 (0.0311)	-0.0239*** (0.0064)	-0.0198*** (0.0075)	-0.0185 (0.0312)
Level 1 (Top Management)	0.6648** (0.2737)	0.6968** (0.3295)	0.3074 (0.7364)	0.5472** (0.2771)	0.5819* (0.3263)	0.2484 (0.7252)
Level 2	0.3039*** (0.0880)	0.2884*** (0.0959)	0.1152 (0.1794)	0.2673*** (0.0887)	0.2610*** (0.0956)	0.1386 (0.1772)
Level 3	0.0000 (0.0000)	---	---	---	---	---
Level 4	-0.3057*** (0.0639)	-0.3165*** (0.0683)	-0.3724*** (0.1108)	-0.2750*** (0.0647)	-0.2916*** (0.0690)	-0.3765*** (0.1105)
2009	0.0217 (0.0616)	0.0041 (0.0457)	-0.0688 (0.0627)	0.0170 (0.0622)	-0.0108 (0.0467)	-0.0789 (0.0684)
2010	0.0000 (0.0000)	---	---	---	---	---
2011	-0.0710 (0.0619)	-0.0724 (0.0467)	0.0167 (0.0684)	-0.1007 (0.0639)	-0.0890* (0.0482)	-0.0219 (0.0742)
Constant	6.8000*** (0.1627)	6.7282*** (0.1829)	8.6101*** (0.9390)	6.7081*** (0.1855)	6.6808*** (0.2083)	8.0292*** -11925
Observations (persons)	7,031	7,031 (3,844)	7,031 (3,844)	7,031	7,031 (3,844)	7,031 (3,844)
R^2 (overall)	0.0353	0.0339	0.0009	0.0377	0.0361	0.0059

Notes: Robust standard errors in parentheses. All wages are divided by 1,000.

Table 4.6: Status quo preferences and loss aversion (relative differences)

	Dependent variable: job satisfaction					
	(1) Total OLS	(2) Total RE	(3) Total FE	(4) Fix/Bonus OLS	(5) Fix/Bonus RE	(6) Fix/Bonus FE
Total Compensation$_t$	0.0046*** (0.0014)	0.0044*** (0.0015)	0.0042 (0.0046)			
Total Comp$_t$ – Total Comp$_{t-1}$	0.0047* (0.0026)	0.0038 (0.0024)	0.0023 (0.0040)			
(Total Comp$_t$ – Total Comp$_{t-1}$)*Decrease	0.0020 (0.0055)	-0.0034 (0.0047)	-0.0062 (0.0064)			
Fixed Salary$_t$				0.0036* (0.0020)	0.1997 (0.2205)	0.0062 (0.0076)
Fixed Salary$_t$ – Fixed Salary$_{t-1}$				0.0097*** (0.3118)	0.8041*** (0.2753)	0.0051 (0.0042)
(Fixed Salary$_t$ – Fixed Salary$_{t-1}$)*Decrease				-0.0108* (0.0062)	-0.01131* (0.0058)	-0.0136 (0.0095)
Bonus$_t$				0.0016*** (0.0006)	0.0020*** (0.0006)	0.0019 (0.0012)
Bonus$_t$ – Bonus$_{t-1}$				-0.0009 (0.0008)	-0.0016** (0.0007)	-0.0025** (0.0010)
(Bonus$_t$ – Bonus$_{t-1}$)*Decrease				0.0030** (0.0014)	0.0021 (0.0014)	0.0028 (0.00018)
Female (dummy)	0.0339 (0.0968)	-0.0066 (0.1196)		0.0228 (0.0972)	-0.0202 (0.1201)	
In Relationship (dummy)	0.1916* (0.1078)	0.1889 (0.1186)	-0.2426 (0.2113)	0.1846* (0.1075)	0.1888 (0.1185)	-0.2252 (0.2099)
Children in Household (1=yes)	0.0177 (0.0637)	0.0149 (0.0713)	-0.1431 (0.1542)	0.0133 (0.0637)	0.0089 (0.0714)	-0.1506 (0.1543)
Distance to workplace (in km)	-0.0037*** (0.0012)	-0.0013 (0.0014)	0.0058* (0.0030)	-0.0037*** (0.0012)	-0.0013 (0.0014)	0.0059* (0.0030)
Up to 100 employees	-0.1116 (0.2174)	-0.0818 (0.2720)	0.5447 (0.9430)	-0.0630 (0.2165)	-0.0431 (0.2687)	0.6668 (0.9193)
1-300 employees	-0.1366 (0.1868)	-0.0870 (0.2129)	0.4796 (0.4221)	-0.1362 (0.1864)	-0.0872 (0.2112)	0.4709 (0.4178)
301-1,000 employees	0.1524 (0.1244)	0.0324 (0.1390)	-0.1065 (0.2766)	0.1578 (0.1247)	0.0384 (0.1388)	-0.0967 (0.2758)
1,001-2,000 employees	---	---	---	---	---	---
2,001-5,000 employees	-0.0302 (0.1148)	-0.0306 (0.1213)	-0.1105 (0.2064)	-0.0440 (0.1149)	-0.0342 (0.1216)	-0.0799 (0.2052)
5,001-10,000 employees	-0.2415** (0.1202)	-0.2161* (0.1275)	-0.3054 (0.2332)	-0.2794** (0.1200)	-0.2453* (0.1275)	-0.2774 (0.2300)
10,001-30,000 employees	0.2265** (0.1017)	0.2021* (0.1124)	-0.0806 (0.2373)	0.1681 (0.1026)	0.1606 (0.1134)	-0.0486 (0.2353)
At least 30,001 employees	0.4540*** (0.1050)	0.3947*** (0.1159)	0.0254 (0.2634)	0.4053*** (0.1069)	0.3433*** (0.1178)	0.0509 (0.2629)
Tenure (in years)	-0.0031 (0.0056)	-0.0067 (0.0068)	-0.0558** (0.0261)	-0.0030 (0.0056)	-0.0065 (0.0068)	-0.0532** (0.0257)
Experience (in years)	-0.0213*** (0.0066)	-0.0158** (0.0079)	0.0250 (0.0279)	-0.0220*** (0.0068)	-0.0157* (0.0081)	0.0248 (0.0282)
Level 1 (Top Management)	0.5423* (0.2985)	0.5094 (0.3325)	0.0690 (0.6572)	0.4634 (0.2966)	0.4715 (0.3279)	0.0307 (0.6310)
Level 2	0.2855*** (0.0922)	0.3093*** (0.0995)	0.2982* (0.1799)	0.2766*** (0.0903)	0.3203*** (0.0978)	0.3174* (0.1803)
Level 3	---	---	---	---	---	---
Level 4	-0.2828*** (0.0697)	-0.2821*** (0.0734)	-0.3588*** (0.1140)	-0.2515*** (0.0711)	-0.2662*** (0.0748)	-0.3592*** (0.1147)
2009	0.0139 (0.0643)	0.0109 (0.0474)	0.0094 (0.0627)	-0.0035 (0.0647)	-0.0124 (0.0483)	0.0029 (0.0669)
2010	---	---	---	---	---	---
2011	-0.1016 (0.0657)	-0.0918* (0.0494)	-0.0747 (0.0741)	-0.0975 (0.0679)	-0.0769 (0.0508)	-0.0625 (0.0757)
Constant	1.8716 (1.5356)	1.8978 (1.6897)	2.5929 (5.4454)	1.6231 (2.0154)	2.9378 (2.2725)	-1.4474 (8.8532)
Observations (persons)	6,350	6,350 (3,501)	6,350 (3,501)	6,350	6,350 (3,501)	6,350 (3,501)
R^2 (overall)	0.0342	0.0325	0.0041	0.0368	0.0348	0.0080

Notes: Robust standard errors in parentheses. All wages are divided by 1,000, then logarithmized ,and again divided by 100.

4.6.2 Social Comparisons

After the investigation of the hitherto status quo as a possible reference point, the relevance of social comparisons will be addressed in the following subchapter. It starts with comparisons on the market level.

4.6.2.1 Market Level

As there are no restrictions on managers with sufficient wage data from both the current and the previous year anymore, the whole sample of about 14,800 observations can be explored. To start with the absolute difference between wage and reference wage (computed as described in chapter 4.5.2), Table 4.7 presents the results for total compensation as well as fixed salaries and bonuses. The relevance of social comparisons is indicated by the coefficient of the respective reference wages. First, comparing the results to those of the analyses of status quo preferences (see Table 4.3), we do not see any considerable differences with respect to the coefficients of the control variables. A similar picture emerges for the coefficients of the current payments which are also comparable at least in their direction and significance. Moreover, the reference wages with respect to total compensation and to fixed salaries exert a negative and significant influence on job satisfaction. In other words, the bigger the differential between the wage and the reference point on the market is, the higher is the reported satisfaction. This result remains robust in fixed-effects estimations so that it can be seen as an effect on job satisfaction. The marginal effects are thereby considerably higher than those of the own income which is in favor of a certain relevance of social comparisons. Besides, the effects for fixed payments are more pronounced than those for total compensation. It is also evident that the coefficients become smaller when it is additionally controlled for unobserved heterogeneity (what the fixed-effects estimations do). Overall, the results are quite similar focusing on relative differences in Table 4.8.

However, effect sizes are rather small. A total compensation which is 10,000 € below the reference wage diminishes the satisfaction score ceteris paribus by only $10 \times 0.0110 \approx 0.1$ points. Similarly, earning 10 percent less than the reference wage leads to a satisfaction decrease of about $10 \times 0.01343 \approx 0.1$ points. Related to the overall variation of job satisfaction (see Table Table 4.2), this represents only 5 percent of one standard deviation. However, the impact with

respect to fixed salaries is considerably larger. Here, a 10,000 € deviation leads to an effect on job satisfaction of 10x0.0263 ≈ 0.3 points.

There are some arguments that managers who earn less than their counterparts suffer in particular from this situation (see chapter 4.2.2). This possible social loss aversion is tested, with the results for absolute differences presented in Table 4.9. The relevance of social loss aversion is indicated by the coefficient of the interaction term between the respective wage differences and the *Below* dummy, whereas social loss aversion would be shown by a positive coefficient. In the cross-sectional model with respect to total compensation, we see a positive and significant coefficient of the interaction term of the wage difference and the dummy variable for managers earning less than the reference income. This represents the kinked curve in Figure 4.4 with a steeper slope below the origin. The interaction term for bonus payments is significant, too. However, the overall effect for managers receiving a bonus which is lower than their reference bonus is not significant as one has to add the main effect for the difference between the own bonus and the reference bonus (= the effect/slope for managers over the reference point) which has a negative sign and a similar size.[34] The significances, though, disappear when controlling for unobserved heterogeneity in the fixed-effects models. Regarding fixed salaries, there is no evidence for social loss aversion. Running equivalent regressions with logarithmized wages does not lead to significant results for any wage component with respect to social loss aversion (see Table 4.10).

Finally, a potential correlation between individual´s rank within the wage distribution on the whole labor market and job satisfaction is investigated. The results in Table 4.11 show a positive impact of a higher rank for all three income types. For fixed salaries and bonuses, however, the significance disappears in the fixed-effects model. The effects are rather small as, for instance, the satisfaction differential between the 10th percentile and the 90th percentile for total compensation is only 80x0.0026 ≈ 0.2 satisfaction points.[35]

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[34] This can be statistically tested by reversing the dummy variable that is interacted with the absolute bonus difference. This reveals a non-significant effect.

[35] It has been tested whether the correlation between job satisfaction and the wage rank follows a non-linear path by adding a squared term of the wage percentile to the regression. However, the coefficient is not significant.

Table 4.7: Social comparisons on the market level (absolute differences)

	Dependent variable: job satisfaction					
	(1) Total OLS	(2) Total RE	(3) Total FE	(4) Fix/Bonus OLS	(5) Fix/Bonus RE	(6) Fix/Bonus FE
Total Compensation	0.0032*** (0.0005)	0.0030*** (0.0005)	0.0014 (0.0009)			
Total Comp^{ref}	-0.0163*** (0.0034)	-0.0135*** (0.0034)	-0.0110** (0.0047)			
Fixed Salary				0.0045*** (0.0012)	0.0049*** (0.0013)	0.0058 (0.0035)
Fixed Salary^{ref}				-0.0505*** (0.0078)	-0.0430*** (0.0076)	-0.0263** (0.0112)
Bonus				0.0052*** (0.0014)	0.0045*** (0.0013)	0.0020 (0.0021)
Bonus^{ref}				0.0063 (0.0072)	0.0039 (0.0067)	-0.0047 (0.0085)
Female (dummy)	0.0120 (0.0597)	-0.0066 (0.0737)		0.0211 (0.0597)	0.0009 (0.0737)	
In Relationship (dummy)	0.1796** (0.0705)	0.1103 (0.0751)	-0.1007 (0.1201)	0.1682** (0.0705)	0.1004 (0.0750)	-0.1016 (0.1198)
Children in Household (1=yes)	0.0630 (0.0413)	0.0743 (0.0484)	0.0969 (0.1139)	0.0885** (0.0415)	0.0952** (0.0485)	0.1122 (0.1147)
Distance to workplace (in km)	-0.0027*** (0.0008)	-0.0016* (0.0009)	0.0012 (0.0019)	-0.0027*** (0.0008)	-0.0016* (0.0009)	0.0011 (0.0019)
Up to 100 employees	-0.4346*** (0.1587)	-0.3748** (0.1788)	-0.2512 (0.5169)	-0.8322*** (0.1709)	-0.7353*** (0.1912)	-0.4707 (0.5277)
1-300 employees	-0.4840*** (0.1280)	-0.3692*** (0.1413)	-0.2165 (0.2656)	-0.5855*** (0.1267)	-0.4707*** (0.1412)	-0.2853 (0.2681)
301-1,000 employees	0.0574 (0.0832)	-0.0177 (0.0890)	-0.2106 (0.1527)	-0.0225 (0.0837)	-0.0915 (0.0894)	-0.2577* (0.1538)
1,001-2,000 employees	---	---	---	---	---	---
2,001-5,000 employees	0.0561 (0.0759)	0.0578 (0.0832)	-0.0964 (0.1384)	0.1221 (0.0779)	0.1165 (0.0854)	-0.0622 (0.1410)
5,001-10,000 employees	0.0685 (0.0838)	0.0823 (0.0902)	-0.0933 (0.1484)	0.1196 (0.0823)	0.1347 (0.0896)	-0.0573 (0.1496)
10,001-30,000 employees	0.6494*** (0.0864)	0.5443*** (0.0921)	0.0941 (0.1583)	0.8787*** (0.0965)	0.7561*** (0.1034)	0.2305 (0.1780)
At least 30,001 employees	0.6924*** (0.0813)	0.5599*** (0.0874)	0.0200 (0.1617)	0.5843*** (0.0791)	0.4852*** (0.0855)	-0.0016 (0.1610)
Tenure (in years)	-0.0016 (0.0035)	-0.0076* (0.0042)	-0.0611*** (0.0142)	-0.0011 (0.0035)	-0.0069 (0.0042)	-0.0603*** (0.0142)
Experience (in years)	0.0066 (0.0075)	0.0072 (0.0078)	0.0127 (0.0191)	0.0428*** (0.0105)	0.0380*** (0.0107)	0.0254 (0.0202)
Level 1 (Top Management)	1.9283*** (0.3055)	1.6161*** (0.3209)	0.9562 (0.5976)	2.8646*** (0.3410)	2.4727*** (0.3658)	1.4623** (0.6861)
Level 2	0.8213*** (0.1340)	0.6706*** (0.1372)	0.3944* (0.2116)	1.1869*** (0.1406)	1.0152*** (0.1470)	0.5981** (0.2450)
Level 3	---	---	---	---	---	---
Level 4	-0.5876*** (0.0744)	-0.4995*** (0.0736)	-0.3615*** (0.1047)	-0.8684*** (0.0913)	-0.7474*** (0.0917)	-0.4995*** (0.1395)
2008	0.0444 (0.0497)	0.0565 (0.0409)	-0.0112 (0.0627)	-0.1081* (0.0622)	-0.0651 (0.0531)	-0.0487 (0.0816)
2009	-0.0140 (0.0489)	-0.0115 (0.0370)	-0.0632 (0.0456)	-0.0743 (0.0514)	-0.0619 (0.0395)	-0.0779 (0.0505)
2010	---	---	---	---	---	---
2011	-0.0761 (0.0492)	-0.0851** (0.0381)	-0.0325 (0.0490)	-0.0894* (0.0495)	-0.0952** (0.0384)	-0.0476 (0.0514)
Constant	7.8000*** (0.2383)	7.6434*** (0.2414)	8.7011*** (0.5899)	9.6611*** (0.4510)	9.2227*** (0.4466)	9.2719*** (0.8946)
Observations (persons)	14,773	14,773 (7,538)	14,773 (7,538)	14,773	14,773 (7,538)	14,773 (7,538)
R^2 (overall)	0.0312	0.0303	0.0019	0.0339	0.0330	0.0041

Notes: Robust standard errors in parentheses. All wages are divided by 1,000.

Table 4.8: Social comparisons on the market level (relative differences)

	Dependent variable: job satisfaction					
	(1) Total OLS	(2) Total RE	(3) Total FE	(4) Fix/Bonus OLS	(5) Fix/Bonus RE	(6) Fix/Bonus FE
Total Compensation	0.0056*** (0.0009)	0.0056*** (0.0010)	0.0054*** (0.0020)			
Total Comp^{ref}	-0.0287*** (0.0041)	-0.0237*** (0.0041)	-0.01343** (0.0060)			
Fixed Salary				0.0034*** (0.0011)	0.0031*** (0.0012)	0.0032 (0.0023)
Fixed Salary^{ref}				-0.0437*** (0.0065)	-0.03783*** (0.0063)	-0.0171* (0.0102)
Bonus				0.0017*** (0.0003)	0.0015*** (0.0003)	0.0007 (0.0005)
Bonus^{ref}				0.0006 (0.0018)	0.0001 (0.0015)	-0.0011 (0.0018)
Female (dummy)	0.0293 (0.0618)	-0.0092 (0.0764)		0.0289 (0.0617)	-0.0126 (0.0763)	
In Relationship (dummy)	0.1690** (0.0731)	0.0794 (0.0768)	-0.1930 (0.1214)	0.1626** (0.0730)	0.0752 (0.0766)	-0.1938 (0.1213)
Children in Household (1=yes)	0.1010** (0.0431)	0.1089** (0.0502)	0.1137 (0.1177)	0.1209*** (0.0433)	0.1334*** (0.0504)	0.1234 (0.1185)
Distance to workplace (in km)	-0.0024*** (0.0008)	-0.0011 (0.0010)	0.0017 (0.0019)	-0.0024*** (0.0008)	-0.0011 (0.0010)	0.0017 (0.0019)
Up to 100 employees	-0.7131*** (0.1723)	-0.5855*** (0.1986)	0.0676 (0.5845)	-0.7632*** (0.1736)	-0.7204*** (0.1994)	-0.0283 (0.5934)
1-300 employees	-0.5611*** (0.1353)	-0.3975*** (0.1446)	0.0221 (0.2740)	-0.4769*** (0.1409)	-0.3758** (0.1474)	0.0001 (0.2760)
301-1,000 employees	-0.0120 (0.0878)	-0.0664 (0.0933)	-0.2170 (0.1649)	0.0037 (0.0905)	-0.0766 (0.0950)	-0.2369 (0.1664)
1,001-2,000 employees	---	---	---	---	---	---
2,001-5,000 employees	0.0353 (0.0793)	0.0479 (0.0849)	-0.1047 (0.1391)	0.0805 (0.0818)	0.0874 (0.0878)	-0.1019 (0.1436)
5,001-10,000 employees	0.1196 (0.0871)	0.1319 (0.0929)	-0.1071 (0.1558)	0.0655 (0.0849)	0.1091 (0.0909)	-0.1217 (0.1560)
10,001-30,000 employees	0.7391*** (0.0906)	0.6225*** (0.0957)	0.1027 (0.1663)	0.7825*** (0.0907)	0.7026*** (0.0980)	0.1382 (0.1795)
At least 30,001 employees	0.7600*** (0.0849)	0.6201*** (0.0903)	0.0399 (0.1674)	0.5114*** (0.0958)	0.4516*** (0.0938)	-0.0142 (0.1671)
Tenure (in years)	-0.0028 (0.0036)	-0.0080* (0.0044)	-0.0581*** (0.0156)	-0.0026 (0.0036)	-0.0074* (0.0044)	-0.0576*** (0.0155)
Experience (in years)	0.0266*** (0.0084)	0.0229*** (0.0088)	0.0328* (0.0196)	0.0445*** (0.0094)	0.0423*** (0.0101)	0.0356* (0.0211)
Level 1 (Top Management)	2.1440*** (0.2825)	1.7615*** (0.3020)	0.7126 (0.5589)	2.3402*** (0.2753)	2.0909*** (0.3034)	0.8424 (0.5950)
Level 2	1.0262*** (0.1232)	0.8592*** (0.1280)	0.4644** (0.2062)	1.0764*** (0.1136)	0.9795*** (0.1218)	0.5092** (0.2213)
Level 3	---	---	---	---	---	---
Level 4	-0.7701*** (0.0855)	-0.6381*** (0.0846)	-0.4047*** (0.1208)	-0.8605*** (0.0863)	-0.7665*** (0.0889)	-0.4528*** (0.1448)
2008	0.0436 (0.0509)	0.0561 (0.0422)	0.0282 (0.0657)	-0.1208* (0.0708)	-0.0724 (0.0586)	-0.0175 (0.0842)
2009	-0.0120 (0.0501)	0.0009 (0.0381)	-0.0101 (0.0472)	-0.0631 (0.0533)	-0.0421 (0.0409)	-0.0297 (0.0516)
2010	---	---	---	---	---	---
2011	-0.0953* (0.0503)	-0.1020*** (0.0390)	-0.0905* (0.0527)	-0.1112** (0.0506)	-0.1118*** (0.0393)	-0.0719 (0.0522)
Constant	32.743*** (4.4190)	27.109*** (4.4247)	16.448** (6.7609)	49.544*** (6.1771)	44.023*** (6.2150)	23.487** (10.655)
Observations (persons)	13,953	13,953 (7,205)	13,953 (7,205)	13,953	13,953 (7,205)	13,953 (7,205)
R^2 (overall)	0.0315	0.0305	0.0044	0.0335	0.0327	0.0037

Notes: Robust standard errors in parentheses. All wages are divided by 1,000, then logarithmized, and again divided by 1,000.

Table 4.9: Social comparisons and loss aversion (market level, absolute differences)

	Dependent variable: job satisfaction					
	(1) Total OLS	(2) Total RE	(3) Total FE	(4) Fix/Bonus OLS	(5) Fix/Bonus RE	(6) Fix/Bonus FE
Total Compensation	-0.0122*** (0.0033)	-0.0094*** (0.0033)	-0.0079* (0.0046)			
Total Comp – Total Comp^{ref}	0.0140*** (0.0035)	0.0112*** (0.0034)	0.0088* (0.0046)			
(Total Comp – Total Comp^{ref})*Below	0.0075*** (0.0020)	0.0069*** (0.0021)	0.0054 (0.0034)			
Fixed Salary				-0.0467*** (0.0077)	-0.0385*** (0.0076)	-0.0206* (0.0112)
Fixed Salary – Fixed Salary^{ref}				0.0507*** (0.0078)	0.0433*** (0.0077)	0.0282** (0.0115)
(Fixed Salary – Fixed Salary^{ref})*Below				0.0010 (0.0035)	-0.0001 (0.0036)	-0.0041 (0.0061)
Bonus				0.0152** (0.0072)	0.0108 (0.0067)	-0.0022 (0.0084)
Bonus – Bonus^{ref}				-0.0130* (0.0074)	-0.0083 (0.0069)	0.0034 (0.0087)
(Bonus – Bonus^{ref})*Below				0.0166*** (0.0049)	0.0108** (0.0047)	0.0033 (0.0065)
Female (dummy)	0.0213 (0.0598)	0.0049 (0.0739)		0.0225 (0.0597)	0.0020 (0.0737)	
In Relationship (dummy)	0.1731** (0.0705)	0.1054 (0.0750)	-0.1001 (0.1200)	0.1664** (0.0705)	0.0997 (0.0749)	-0.1026 (0.1197)
Children in Household (1=yes)	0.0572 (0.0412)	0.0677 (0.0483)	0.0952 (0.1139)	0.0856** (0.0415)	0.0930* (0.0485)	0.1111 (0.1148)
Distance to workplace (in km)	-0.0027*** (0.0008)	-0.0016* (0.0009)	0.0012 (0.0019)	-0.0027*** (0.0008)	-0.0016* (0.0009)	0.0012 (0.0019)
Up to 100 employees	-0.4171*** (0.1587)	-0.3588** (0.1789)	-0.2617 (0.5203)	-0.8441*** (0.1713)	-0.7444*** (0.1915)	-0.4772 (0.5278)
1-300 employees	-0.4746*** (0.1283)	-0.3621** (0.1416)	-0.2195 (0.2662)	-0.5904*** (0.1271)	-0.4771*** (0.1413)	-0.2903 (0.2677)
301-1,000 employees	0.0610 (0.0833)	-0.0142 (0.0890)	-0.2117 (0.1528)	-0.0235 (0.0837)	-0.0917 (0.0893)	-0.2560* (0.1538)
1,001-2,000 employees	---	---	---	---	---	---
2,001-5,000 employees	0.0589 (0.0759)	0.0576 (0.0833)	-0.0942 (0.1384)	0.1162 (0.0780)	0.1121 (0.0854)	-0.0604 (0.1410)
5,001-10,000 employees	0.0657 (0.0838)	0.0753 (0.0902)	-0.0969 (0.1485)	0.1054 (0.0824)	0.1248 (0.0898)	-0.0532 (0.1498)
10,001-30,000 employees	0.6388*** (0.0865)	0.5320*** (0.0921)	0.0943 (0.1582)	0.8602*** (0.0967)	0.7448*** (0.1034)	0.2367 (0.1781)
At least 30,001 employees	0.6899*** (0.0813)	0.5534*** (0.0874)	0.0252 (0.1618)	0.5563*** (0.0796)	0.4701*** (0.0856)	0.0009 (0.1610)
Tenure (in years)	-0.0027 (0.0035)	-0.0086** (0.0043)	-0.0611*** (0.0142)	-0.0021 (0.0035)	-0.0075* (0.0043)	-0.0602*** (0.0142)
Experience (in years)	0.0074 (0.0075)	0.0073 (0.0078)	0.0132 (0.0190)	0.0445*** (0.0105)	0.0387*** (0.0108)	0.0252 (0.0203)
Level 1 (Top Management)	1.9874*** (0.3076)	1.6593*** (0.3235)	0.9875* (0.6000)	2.9659*** (0.3450)	2.5268*** (0.3700)	1.4634** (0.6882)
Level 2	0.8441*** (0.1346)	0.6843*** (0.1379)	0.4008* (0.2123)	1.2229*** (0.1417)	1.0339*** (0.1482)	0.6036** (0.2452)
Level 3	---	---	---	---	---	---
Level 4	-0.5813*** (0.0745)	-0.4971*** (0.0735)	-0.3710*** (0.1059)	-0.8717*** (0.0915)	-0.7508*** (0.0920)	-0.5007*** (0.1400)
2008	0.0490 (0.0497)	0.0601 (0.0409)	-0.0024 (0.0632)	-0.1082* (0.0623)	-0.0657 (0.0531)	-0.0480 (0.0816)
2009	-0.0123 (0.0488)	-0.0100 (0.0370)	-0.0574 (0.0459)	-0.0724 (0.0514)	-0.0609 (0.0395)	-0.0778 (0.0507)
2010	---	---	---	---	---	---
2011	-0.0787 (0.0492)	-0.0888** (0.0382)	-0.0440 (0.0501)	-0.0878* (0.0495)	-0.0939** (0.0385)	-0.0473 (0.0514)
Constant	7.7634*** (0.2388)	7.5999*** (0.2404)	8.5490*** (0.5892)	9.7293*** (0.4531)	9.2583*** (0.4478)	9.2606*** (0.8941)
Observations (persons)	14,773	14,773 (7,538)	14,773 (7,538)	14,773	14,773 (7,538)	14,773 (7,538)
R^2 (overall)	0.0322	0.0314	0.0030	0.0349	0.0339	0.0043

Notes: Robust standard errors in parentheses. All wages are divided by 1,000.

Table 4.10: Social comparisons and loss aversion (market level, relative differences)

	Dependent variable: job satisfaction					
	(1) Total OLS	(2) Total RE	(3) Total FE	(4) Fix/Bonus OLS	(5) Fix/Bonus RE	(6) Fix/Bonus FE
Total Compensation	-0.0230*** (0.0040)	-0.0180*** (0.0040)	-0.0079 (0.0060)			
Total Comp – Total Comp^{ref}	0.0272*** (0.0042)	0.0231*** (0.0042)	0.0128** (0.0061)			
(Total Comp – Total Comp^{ref})*Below	0.0036 (0.0026)	0.0013 (0.0025)	0.0015 (0.0036)			
Fixed Salary				-0.0403*** (0.0064)	-0.0346*** (0.0062)	-0.0133 (0.0101)
Fixed Salary – Fixed Salary^{ref}				0.0445*** (0.0066)	0.0397*** (0.0065)	0.0202* (0.0011)
(Fixed Salary – Fixed Salary^{ref})*Below				-0.0017 (0.0030)	-0.0034 (0.0031)	-0.0049 (0.0054)
Bonus				0.0023 (0.0018)	0.0015 (0.0016)	-0.0004 (0.0018)
Bonus – Bonus^{ref}				-0.0003 (0.0019)	0.0003 (0.0016)	0.0012 (0.0018)
(Bonus – Bonus^{ref})*Below				-0.0006 (0.0009)	-0.0005 (0.0009)	-0.0001 (0.0012)
Female (dummy)	0.0318 (0.0618)	-0.0079 (0.0765)		0.0285 (0.0617)	-0.0138 (0.0763)	
In Relationship (dummy)	0.1690** (0.0731)	0.0795 (0.0768)	-0.1929 (0.1214)	0.1619** (0.0730)	0.0732 (0.0767)	-0.1954 (0.1212)
Children in Household (1=yes)	0.0997** (0.0431)	0.1084** (0.0502)	0.1133 (0.1176)	0.1212*** (0.0433)	0.1332*** (0.0504)	0.1220 (0.1186)
Distance to workplace (in km)	-0.0024*** (0.0008)	-0.0011 (0.0010)	0.0017 (0.0019)	-0.0024*** (0.0008)	-0.0011 (0.0010)	0.0017 (0.0019)
Up to 100 employees	-0.7010*** (0.1725)	-0.5814*** (0.1987)	0.0677 (0.5854)	-0.7705*** (0.1742)	-0.7335*** (0.2001)	-0.0431 (0.5936)
1-300 employees	-0.5549*** (0.1355)	-0.3954*** (0.1447)	0.0242 (0.2739)	-0.4816*** (0.1413)	-0.3841*** (0.1475)	-0.0089 (0.2757)
301-1,000 employees	-0.0092 (0.0879)	-0.0654 (0.0932)	-0.2164 (0.1648)	0.0017 (0.0906)	-0.0799 (0.0951)	-0.2371 (0.1664)
1,001-2,000 employees	---	---	---	---	---	---
2,001-5,000 employees	0.0377 (0.0794)	0.0484 (0.0849)	-0.1042 (0.1390)	0.0799 (0.0819)	0.0873 (0.0879)	-0.0970 (0.1434)
5,001-10,000 employees	0.1193 (0.0871)	0.1312 (0.0929)	-0.1085 (0.1560)	0.0684 (0.0850)	0.1138 (0.0910)	-0.1103 (0.1562)
10,001-30,000 employees	0.7369*** (0.0906)	0.6213*** (0.0957)	0.1019 (0.1663)	0.7851*** (0.0907)	0.7079*** (0.0980)	0.1550 (0.1805)
At least 30,001 employees	0.7605*** (0.0849)	0.6200*** (0.0903)	0.0403 (0.1673)	0.5139*** (0.0959)	0.4551*** (0.0938)	-0.0108 (0.1669)
Tenure (in years)	-0.0030 (0.0036)	-0.0081* (0.0044)	-0.0582*** (0.0156)	-0.0024 (0.0036)	-0.0072 (0.0044)	-0.0574*** (0.0155)
Experience (in years)	0.0269*** (0.0084)	0.0230*** (0.0088)	0.0327* (0.0196)	0.0441*** (0.0094)	0.0417*** (0.0101)	0.0365* (0.0212)
Level 1 (Top Management)	2.1604*** (0.2833)	1.7673*** (0.3025)	0.7160 (0.5587)	2.3235*** (0.2761)	2.0721*** (0.3039)	0.8609 (0.5946)
Level 2	1.0349*** (0.1234)	0.8615*** (0.1284)	0.4639** (0.2062)	1.0687*** (0.1139)	0.9739*** (0.1220)	0.5275** (0.2221)
Level 3	---	---	---	---	---	---
Level 4	-0.7698*** (0.0855)	-0.6383*** (0.0846)	-0.4060*** (0.1212)	-0.8592*** (0.0863)	-0.7656*** (0.0889)	-0.4612*** (0.1451)
2008	0.0451 (0.0509)	0.0567 (0.0422)	0.0290 (0.0658)	-0.1228* (0.0711)	-0.0738 (0.0591)	-0.0112 (0.0853)
2009	-0.0115 (0.0501)	0.0011 (0.0381)	-0.0097 (0.0472)	-0.0642 (0.0533)	-0.0434 (0.0410)	-0.0274 (0.0517)
2010	---	---	---	---	---	---
2011	-0.0937* (0.0502)	-0.1013*** (0.0389)	-0.0901* (0.0527)	-0.1160** (0.0514)	-0.1166*** (0.0402)	-0.0788 (0.0539)
Constant	32.634*** (4.4222)	27.0611*** (4.4222)	16.3175** (6.7426)	49.397*** (6.1767)	43.815*** (6.2139)	22.656** (10.722)
Observations (persons)	13,953	13,953 (7,205)	13,953 (7,205)	13,953	13,953 (7,205)	13,953 (7,205)
R^2 (overall)	0.0317	0.0305	0.0046	0.0336	0.0327	0.0044

Notes: Robust standard errors in parentheses. All wages are divided by 1,000, then logarithmized, and again divided by 100.

Table 4.11: Social comparisons on the market level (wage ranks)

	Dependent variable: job satisfaction					
	(1) Total OLS	(2) Total RE	(3) Total FE	(4) Fix/Bonus OLS	(5) Fix/Bonus RE	(6) Fix/Bonus FE
Total Compensation	0.0005 (0.0006)	0.0009 (0.0006)	0.0004 (0.0009)			
Total Compensation^{rank}	0.0044*** (0.0008)	0.0038*** (0.0008)	0.0026** (0.0013)			
Fixed Salary				-0.0008 (0.0018)	0.0005 (0.0019)	0.0034 (0.0038)
Fixed Salary^{rank}				0.0027*** (0.0010)	0.0023** (0.0010)	0.0013 (0.0015)
Bonus				0.0011 (0.0016)	0.0020 (0.0015)	0.0018 (0.0026)
Bonus^{rank}				0.0038*** (0.0008)	0.0022*** (0.0008)	-0.0003 (0.0011)
Female (dummy)	0.0196 (0.0599)	0.0026 (0.0740)		0.0152 (0.0599)	-0.0010 (0.0739)	
In Relationship (dummy)	0.1648** (0.0706)	0.0962 (0.0749)	-0.1103 (0.1194)	0.1676** (0.0705)	0.0995 (0.0749)	-0.1070 (0.1198)
Children in Household (1=yes)	0.0397 (0.0411)	0.0534 (0.0482)	0.0846 (0.1135)	0.0380 (0.0412)	0.0516 (0.0482)	0.0842 (0.1137)
Distance to workplace (in km)	-0.0027*** (0.0008)	-0.0016* (0.0009)	0.0012 (0.0019)	-0.0028*** (0.0008)	-0.0016* (0.0009)	0.0013 (0.0019)
Up to 100 employees	-0.0129 (0.1204)	-0.0325 (0.1488)	0.0213 (0.5132)	-0.0380 (0.1226)	-0.0338 (0.1510)	0.0675 (0.5134)
1-300 employees	-0.2540** (0.1147)	-0.1857 (0.1302)	-0.0688 (0.2579)	-0.2639** (0.1150)	-0.1831 (0.1307)	-0.0407 (0.2596)
301-1,000 employees	0.1684** (0.0786)	0.0715 (0.0844)	-0.1440 (0.1500)	0.1645** (0.0788)	0.0729 (0.0846)	-0.1310 (0.1507)
1,001-2,000 employees	---	---	---	---	---	---
2,001-5,000 employees	0.0292 (0.0756)	0.0318 (0.0830)	-0.1148 (0.1382)	0.0321 (0.0756)	0.0325 (0.0831)	-0.1145 (0.1383)
5,001-10,000 employees	-0.0591 (0.0774)	-0.0236 (0.0846)	-0.1720 (0.1422)	-0.0532 (0.0775)	-0.0247 (0.0849)	-0.1891 (0.1422)
10,001-30,000 employees	0.4245*** (0.0662)	0.3636*** (0.0744)	-0.0347 (0.1425)	0.4362*** (0.0678)	0.3648*** (0.0760)	-0.0635 (0.1438)
At least 30,001 employees	0.5301*** (0.0684)	0.4228*** (0.0765)	-0.0822 (0.1528)	0.5354*** (0.0685)	0.4226*** (0.0769)	-0.1205 (0.1553)
Tenure (in years)	-0.0034 (0.0035)	-0.0092** (0.0043)	-0.0613*** (0.0142)	-0.0037 (0.0035)	-0.0092** (0.0042)	-0.0607*** (0.0142)
Experience (in years)	-0.0179*** (0.0041)	-0.0134*** (0.0047)	-0.0009 (0.0177)	-0.0159*** (0.0045)	-0.0130** (0.0051)	-0.0039 (0.0179)
Level 1 (Top Management)	0.8729*** (0.1706)	0.7286*** (0.2080)	0.1846 (0.4555)	0.9239*** (0.1777)	0.7316*** (0.2174)	0.0915 (0.4633)
Level 2	0.3637*** (0.0635)	0.2930*** (0.0704)	0.0866 (0.1289)	0.3893*** (0.0674)	0.2993*** (0.0744)	0.0425 (0.1331)
Level 3	---	---	---	---	---	---
Level 4	-0.3459*** (0.0438)	-0.3178*** (0.0460)	-0.2441*** (0.0747)	-0.3609*** (0.0473)	-0.3172*** (0.0492)	-0.2033*** (0.0779)
2008	0.0212 (0.0493)	0.0360 (0.0404)	-0.0157 (0.0627)	0.0152 (0.0503)	0.0303 (0.0414)	-0.0085 (0.0662)
2009	0.0026 (0.0487)	0.0011 (0.0370)	-0.0458 (0.0456)	-0.0001 (0.0487)	-0.0012 (0.0370)	-0.0413 (0.0460)
2010	---	---	---	---	---	---
2011	-0.0474 (0.0492)	-0.0621 (0.0383)	-0.0277 (0.0489)	-0.0490 (0.0498)	-0.0665* (0.0387)	-0.0429 (0.0518)
Constant	6.7124*** (0.1119)	6.7479*** (0.1221)	7.8202*** (0.4873)	6.6846*** (0.1367)	6.7294*** (0.1468)	7.6431*** (0.5741)
Observations (persons)	14,773	14,773 (7,538)	14,773 (7,538)	14,773	14,773 (7,538)	14,773 (7,538)
R^2 (overall)	0.0317	0.0308	0.0030	0.0328	0.0317	0.0033

Notes: Robust standard errors in parentheses. All wages are divided by 1,000.

Table 4.12: Social comparisons on the firm level (absolute differences)

	Dependent variable: job satisfaction					
	(1) Total OLS	(2) Total RE	(3) Total FE	(4) Fix/Bonus OLS	(5) Fix/Bonus RE	(6) Fix/Bonus FE
Total Compensation	0.0039*** (0.0013)	0.0021 (0.0013)	-0.0013 (0.0015)			
Total Comp^{ref}	-0.0049** (0.0022)	-0.0004 (0.0024)	0.0054 (0.0038)			
Fixed Salary				0.0057 (0.0035)	0.0057 (0.0037)	0.0036 (0.0064)
Fixed Salary^{ref}				-0.0030 (0.0067)	-0.0008 (0.0067)	0.0004 (0.0097)
Bonus				0.0105** (0.0042)	0.0045 (0.0041)	-0.0070 (0.0061)
Bonus^{ref}				-0.0146** (0.0068)	-0.0057 (0.0058)	0.0065 (0.0068)
Female (dummy)	0.1368 (0.1250)	0.1376 (0.1515)		0.1434 (0.1250)	0.1472 (0.1513)	
In Relationship (dummy)	-0.0254 (0.1287)	-0.1148 (0.1362)	-0.3311 (0.2345)	-0.0410 (0.1276)	-0.1319 (0.1350)	-0.3383 (0.2316)
Children in Household (1=yes)	0.1121 (0.0805)	0.1335 (0.0994)	0.2272 (0.2617)	0.1075 (0.0805)	0.1285 (0.0996)	0.2142 (0.2681)
Distance to workplace (in km)	-0.0036* (0.0019)	-0.0024 (0.0021)	-0.0018 (0.0042)	-0.0036* (0.0019)	-0.0024 (0.0022)	-0.0020 (0.0042)
Firm Dummies	yes	yes	yes	yes	yes	yes
Tenure (in years)	-0.0207** (0.0081)	-0.0174* (0.0098)	-0.0270 (0.0272)	-0.0215*** (0.0081)	-0.0185* (0.0098)	-0.0247 (0.0281)
Experience (in years)	0.0036 (0.0092)	-0.0015 (0.0111)	0.0530 (0.0350)	-0.0001 (0.0114)	-0.0042 (0.0131)	0.0595* (0.0344)
Level 1 (Top Management)	0.9846** (0.4024)	0.6562* (0.3427)		0.6770 (0.7405)	0.4155 (0.6993)	
Level 2	0.5376*** (0.2001)	0.3082 (0.2307)	-0.1358 (0.3865)	0.4682** (0.2370)	0.3627 (0.2401)	0.1053 (0.3863)
Level 3	---	---	---	---	---	---
Level 4	-0.3931*** (0.0943)	-0.3501*** (0.1063)	-0.4514** (0.1893)	-0.3643*** (0.1174)	-0.3377*** (0.1210)	-0.5095** (0.2006)
2008	0.0856 (0.0908)	0.0767 (0.0779)	0.1619 (0.1346)	0.1044 (0.0989)	0.0952 (0.0840)	0.2035 (0.1444)
2009	0.0664 (0.0905)	0.0507 (0.0696)	0.0634 (0.0864)	0.0805 (0.0923)	0.0582 (0.0694)	0.0765 (0.0877)
2010	---	---	---	---	---	---
2011	0.0841 (0.0972)	0.0103 (0.0808)	-0.0987 (0.1067)	0.1010 (0.1067)	0.0349 (0.0872)	-0.0469 (0.1096)
Constant	7.6182*** (0.2279)	7.3863*** (0.2540)	6.7934*** (1.0486)	7.4622*** (0.4127)	7.2617*** (0.3992)	6.7170*** (1.2882)
Observations (persons)	3,790	3,790 (1,904)	3,790 (1,904)	3,790	3,790 (1,904)	3,790 (1,904)
R^2 (overall)	0.0635	0.0604	0.0343	0.0653	0.0636	0.0335

Notes: Robust standard errors in parentheses. All wages are divided by 1,000.

Table 4.13: Social comparisons on the firm level (relative differences)

	Dependent variable: job satisfaction					
	(1) Total OLS	(2) Total RE	(3) Total FE	(4) Fix/Bonus OLS	(5) Fix/Bonus RE	(6) Fix/Bonus FE
Total Compensation	0.0081*** (0.0021)	0.0061*** (0.0022)	0.0026 (0.0033)			
Total Comp^{ref}	-0.0083* (0.0042)	-0.0003 (0.0043)	0.0085 (0.0066)			
Fixed Salary				0.0044* (0.0026)	0.0044* (0.0025)	0.2684 (0.3150)
Fixed Salary^{ref}				-0.0109 (0.0077)	-0.0056 (0.0074)	-0.1161 (1.0907)
Bonus				0.0031*** (0.0020)	0.0015* (0.0009)	-0.0723 (0.1260)
Bonus^{ref}				-0.0010 (0.0017)	0.0005 (0.0014)	0.2251 (0.1769)
Female (dummy)	0.1708 (0.1248)	0.1861 (0.1501)		0.1645 (0.1247)	0.1791 (0.1502)	
In Relationship (dummy)	-0.0271 (0.1273)	-0.1164 (0.1340)	-0.3291 (0.2313)	-0.0305 (0.1268)	-0.1191 (0.1339)	-0.3383 (0.2321)
Children in Household (1=yes)	0.0999 (0.0810)	0.1068 (0.0998)	0.1635 (0.2624)	0.0948 (0.0815)	0.1080 (0.0997)	0.1637 (0.2653)
Distance to workplace (in km)	-0.0032* (0.0019)	-0.0021 (0.0021)	-0.0006 (0.0041)	-0.0033* (0.0019)	-0.0022 (0.0021)	-0.0007 (0.0041)
Firm Dummies	yes	yes	yes	yes	yes	yes
Tenure (in years)	-0.0213*** (0.0082)	-0.0181* (0.0098)	-0.0263 (0.0279)	-0.0209** (0.0082)	-0.0175* (0.0098)	-0.0251 (0.0281)
Experience (in years)	0.0029 (0.0104)	-0.0070 (0.0123)	0.0494 (0.0359)	0.0083 (0.0132)	0.0004 (0.0149)	0.0587* (0.0347)
Level 1 (Top Management)	0.8365** (0.3709)	0.5528 (0.3512)		1.0235* (0.5422)	0.7876* (0.4236)	
Level 2	0.4918** (0.2238)	0.2107 (0.2468)	-0.1221 (0.3941)	0.4734** (0.2331)	0.3636 (0.2438)	0.1506 (0.3773)
Level 3	---	---	---	---	---	---
Level 4	-0.3840*** (0.1153)	-0.2808** (0.1249)	-0.3771* (0.2159)	-0.4072*** (0.1481)	-0.3471** (0.1484)	-0.4620** (0.2288)
2008	0.0767 (0.0908)	0.0728 (0.0789)	0.1848 (0.1375)	-0.0022 (0.1010)	0.0352 (0.0866)	0.1737 (0.1504)
2009	0.0514 (0.0904)	0.0414 (0.0700)	0.0750 (0.0880)	0.0105 (0.0936)	0.0175 (0.0718)	0.0605 (0.0912)
2010	---	---	---	---	---	---
2011	0.0574 (0.1010)	-0.0232 (0.0861)	-0.1473 (0.1180)	-0.0259 (0.1107)	-0.0435 (0.0911)	-0.0911 (0.1144)
Constant	7.7546* (4.1884)	0.9123 (4.3551)	-5.6178 (6.7207)	12.753 (7.9546)	7.0365 (7.8507)	3.8469 (12.430)
Observations (persons)	3,754	3,754 (1,893)	3,754 (1,893)	3,754	3,754 (1,893)	3,754 (1,893)
R^2 (overall)	0.0636	0.0619	0.0353	0.0652	0.0636	0.0342

Notes: Robust standard errors in parentheses. All wages are divided by 1,000, then logarithmized, and again divided by 100.

Table 4.14: Social comparisons and loss aversion (firm level, absolute differences)

	Dependent variable: job satisfaction					
	(1) Total OLS	(2) Total RE	(3) Total FE	(4) Fix/Bonus OLS	(5) Fix/Bonus RE	(6) Fix/Bonus FE
Total Compensation	-0.0003 (0.0018)	0.0025 (0.0019)	0.0044 (0.0030)			
(Total Comp – Total Comp^{ref})	0.0032 (0.0029)	-0.0017 (0.0029)	-0.0062 (0.0042)			
(Total Comp – Total Comp^{ref})*Below	0.0037 (0.0044)	0.0048 (0.0043)	0.0022 (0.0060)			
Fixed Salary				0.0028 (0.0060)	0.0050 (0.0057)	0.0037 (0.0082)
(Fixed Salary – Fixed Salary^{ref}				0.0023 (0.0079)	-0.0005 (0.0079)	-0.0044 (0.0114)
(Fixed Salary – Fixed Salary^{ref})*Below				0.0014 (0.0094)	0.0027 (0.0092)	0.0084 (0.0127)
Bonus				-0.0037 (0.0058)	-0.0008 (0.0050)	-0.0009 (0.0054)
(Bonus – Bonus^{ref})				0.0136* (0.0080)	0.0047 (0.0074)	-0.0053 (0.0089)
(Bonus – Bonus^{ref})*Below				0.0033 (0.0118)	0.0033 (0.0106)	-0.0017 (0.0133)
Female (dummy)	0.1404 (0.1250)	0.1437 (0.1516)		0.1445 (0.1250)	0.1498 (0.1514)	
In Relationship (dummy)	-0.0293 (0.1283)	-0.1179 (0.1361)	-0.3318 (0.2351)	-0.0421 (0.1275)	-0.1326 (0.1351)	-0.3353 (0.2337)
Children in Household (1=yes)	0.1122 (0.0805)	0.1329 (0.0994)	0.2271 (0.2621)	0.1078 (0.0805)	0.1294 (0.0997)	0.2168 (0.2685)
Distance to workplace (in km)	-0.0036* (0.0019)	-0.0024 (0.0022)	-0.0019 (0.0042)	-0.0036* (0.0019)	-0.0024 (0.0022)	-0.0021 (0.0042)
Firm Dummies	yes	yes	yes	yes	yes	yes
Tenure (in years)	-0.0211*** (0.0081)	-0.0179* (0.0098)	-0.0271 (0.0271)	-0.0217*** (0.0082)	-0.0188* (0.0098)	-0.0238 (0.0281)
Experience (in years)	0.0035 (0.0092)	-0.0017 (0.0111)	0.0528 (0.0351)	0.0001 (0.0114)	-0.0038 (0.0131)	0.0583* (0.0344)
Level 1 (Top Management)	0.8477** (0.4209)	0.5011 (0.4040)		0.6379 (0.7474)	0.3696 (0.7081)	
Level 2	0.5335*** (0.2008)	0.3124 (0.2315)	-0.1220 (0.3938)	0.4754** (0.2370)	0.3709 (0.2407)	0.0938 (0.3858)
Level 3	---	---	---	---	---	---
Level 4	-0.3833*** (0.0949)	-0.3414*** (0.1065)	-0.4542** (0.1904)	-0.3636*** (0.1173)	-0.3383*** (0.1208)	-0.5116** (0.2003)
2008	0.0848 (0.0908)	0.0763 (0.0778)	0.1629 (0.1348)	0.1049 (0.0989)	0.0961 (0.0841)	0.2023 (0.1435)
2009	0.0654 (0.0905)	0.0493 (0.0696)	0.0632 (0.0864)	0.0804 (0.0922)	0.0583 (0.0696)	0.0772 (0.0879)
2010	---	---	---	---	---	---
2011	0.0777 (0.0975)	0.0030 (0.0805)	-0.1018 (0.1067)	0.0997 (0.1069)	0.0335 (0.0877)	-0.0402 (0.1098)
Constant	7.5763*** (0.2347)	7.3379*** (0.2571)	5.4246*** (1.1246)	7.4579*** (0.4121)	7.2584*** (0.3983)	5.4131*** (1.3239)
Observations (persons)	3,790	3,790 (1,904)	3,790 (1,904)	3,790	3,790 (1,904)	3,790 (1,904)
R^2 (overall)	0.0628	0.0607	0.0018	0.0654	0.0636	0.0015

Notes: Robust standard errors in parentheses. All wages are divided by 1,000.

Table 4.15: Social comparisons and loss aversion (firm level, relative differences)

	Dependent variable: job satisfaction					
	(1) Total OLS	(2) Total RE	(3) Total FE	(4) Fix/Bonus OLS	(5) Fix/Bonus RE	(6) Fix/Bonus FE
Total Compensation	0.0001 (0.0037)	0.0062 (0.0038)	0.0111* (0.0058)			
(Total Comp – Total Comp^{ref})	0.0067 (0.0054)	-0.0030 (0.0053)	-0.0130* (0.0077)			
(Total Comp – Total Comp^{ref})*Below	0.0028 (0.0056)	0.0058 (0.0053)	0.0085 (0.0073)			
Fixed Salary				-0.0069 (0.0073)	-0.0015 (0.0072)	-0.0003 (0.0012)
(Fixed Salary – Fixed Salary^{ref}				0.0073 (0.0094)	0.0031 (0.0091)	-0.0002 (0.0013)
(Fixed Salary – Fixed Salary^{ref})*Below				0.0047 (0.0074)	0.0036 (0.0073)	0.0033 (0.0012)
Bonus				0.0023* (0.0014)	0.0021* (0.0012)	0.0013 (0.0013)
(Bonus – Bonus^{ref})				0.0050** (0.0024)	0.0014 (0.0022)	-0.0048* (0.0028)
(Bonus – Bonus^{ref})*Below				-0.0063** (0.0026)	-0.0028 (0.0024)	0.0041 (0.0032)
Female (dummy)	0.1719 (0.1248)	0.1899 (0.1504)		0.1647 (0.1243)	0.1788 (0.1498)	
In Relationship (dummy)	-0.0268 (0.1272)	-0.1145 (0.1341)	-0.3261 (0.2332)	-0.0243 (0.1264)	-0.1145 (0.1337)	-0.3382 (0.2356)
Children in Household (1=yes)	0.1007 (0.0810)	0.1090 (0.0999)	0.1671 (0.2630)	0.0915 (0.0814)	0.1068 (0.0998)	0.1771 (0.2660)
Distance to workplace (in km)	-0.0032* (0.0019)	-0.0022 (0.0021)	-0.0008 (0.0041)	-0.0033* (0.0018)	-0.0022 (0.0021)	-0.0007 (0.0041)
Firm Dummies	yes	yes	yes	yes	yes	yes
Tenure (in years)	-0.0213*** (0.0082)	-0.0181* (0.0098)	-0.0267 (0.0277)	-0.0199** (0.0082)	-0.0169* (0.0098)	-0.0245 (0.0287)
Experience (in years)	0.0028 (0.0104)	-0.0070 (0.0123)	0.0473 (0.0362)	0.0077 (0.0131)	0.0002 (0.0149)	0.0580* (0.0345)
Level 1 (Top Management)	0.8032** (0.3762)	0.4954 (0.3643)		1.0793** (0.5441)	0.8102* (0.4203)	
Level 2	0.4908** (0.2239)	0.2096 (0.2469)	-0.1594 (0.3966)	0.4400* (0.2334)	0.3576 (0.2438)	0.0581 (0.3831)
Level 3	---	---	---	---	---	---
Level 4	-0.3789*** (0.1159)	-0.2733** (0.1249)	-0.3697* (0.2154)	-0.4129*** (0.1480)	-0.3489** (0.1483)	-0.4540** (0.2284)
2008	0.0771 (0.0908)	0.0742 (0.0789)	0.1805 (0.1373)	-0.0143 (0.1011)	0.0286 (0.0865)	0.1704 (0.1488)
2009	0.0516 (0.0904)	0.0418 (0.0700)	0.0719 (0.0880)	0.0043 (0.0936)	0.0148 (0.0717)	0.0569 (0.0903)
2010	---	---	---	---	---	---
2011	0.0549 (0.1011)	-0.0262 (0.0860)	-0.1417 (0.1183)	-0.0260 (0.1104)	-0.0450 (0.0908)	-0.0760 (0.1168)
Constant	7.4967* (4.2243)	0.5391 (4.3511)	-5.5213 (6.7384)	13.048 (7.9416)	7.2458 (7.8635)	6.2405 (13.437)
Observations (persons)	3,754	3,754 (1,893)	3,754 (1,893)	3,754	3,754 (1,893)	3,754 (1,893)
R^2 (overall)	0.0637	0.0619	0.0357	0.0667	0.0646	0.0322

Notes: Robust standard errors in parentheses. All wages are divided by 1,000, then logarithmized, and again divided by 100.

Table 4.16: Social comparisons on the firm level (wage ranks)

	Dependent variable: job satisfaction					
	(1) Total OLS	(2) Total RE	(3) Total FE	(4) Fix/Bonus OLS	(5) Fix/Bonus RE	(6) Fix/Bonus FE
Total Compensation	0.0016 (0.0011)	0.0016 (0.0010)	0.0011 (0.0012)			
Total Compensation^{rank}	0.0018 (0.0013)	0.0011 (0.0014)	-0.0006 (0.0020)			
Fixed Salary				0.0080** (0.0041)	0.0060 (0.0038)	0.0022 (0.0057)
Fixed Salary^{rank}				-0.0027 (0.0018)	-0.0011 (0.0017)	0.0018 (0.0023)
Bonus				0.0014 (0.0038)	0.0000 (0.0036)	-0.0040 (0.0047)
Bonus^{rank}				0.0051*** (0.0016)	0.0032** (0.0015)	-0.0002 (0.0020)
Female (dummy)	0.1381 (0.1250)	0.1422 (0.1512)		0.1516 (0.1246)	0.1526 (0.1510)	
In Relationship (dummy)	-0.0310 (0.1284)	-0.1210 (0.1361)	-0.3265 (0.2336)	-0.0338 (0.1274)	-0.1276 (0.1349)	-0.3419 (0.2327)
Children in Household (1=yes)	0.1072 (0.0806)	0.1302 (0.0992)	0.2187 (0.2670)	0.0961 (0.0806)	0.1205 (0.0993)	0.2085 (0.2671)
Distance to workplace (in km)	-0.0037** (0.0019)	-0.0024 (0.0021)	-0.0020 (0.0042)	-0.0036* (0.0019)	-0.0024 (0.0021)	-0.0022 (0.0041)
Firm Dummies	yes	yes	yes	yes	yes	yes
Tenure (in years)	-0.0206** (0.0081)	-0.0178* (0.0098)	-0.0255 (0.0278)	-0.0225*** (0.0082)	-0.0192* (0.0098)	-0.0231 (0.0281)
Experience (in years)	-0.0005 (0.0091)	-0.0011 (0.0108)	0.0594* (0.0341)	-0.0066 (0.0101)	-0.0051 (0.0115)	0.0630* (0.0341)
Level 1 (Top Management)	0.5562* (0.3303)	0.6590** (0.2594)		-0.2070 (0.6615)	0.2432 (0.5722)	
Level 2	0.3163* (0.1700)	0.3179* (0.1675)	0.2203 (0.2872)	0.1780 (0.1804)	0.3016* (0.1763)	0.3235 (0.2844)
Level 3	---	---	---	---	---	---
Level 4	-0.3413*** (0.0909)	-0.3579*** (0.1021)	-0.5305*** (0.1871)	-0.2617*** (0.0990)	-0.3276*** (0.1085)	-0.5894*** (0.1938)
2008	0.0785 (0.0908)	0.0773 (0.0773)	0.1808 (0.1336)	0.0893 (0.0948)	0.0952 (0.0803)	0.2278 (0.1398)
2009	0.0675 (0.0905)	0.0511 (0.0696)	0.0698 (0.0859)	0.0690 (0.0915)	0.0583 (0.0698)	0.0909 (0.0864)
2010	---	---	---	---	---	---
2011	0.0453 (0.0961)	0.0111 (0.0774)	-0.0600 (0.0998)	0.0371 (0.0992)	0.0215 (0.0810)	-0.0124 (0.1071)
Constant	7.3206*** (0.1991)	7.3474*** (0.2224)	7.0123*** -10381	6.8993*** (0.2649)	7.0662*** (0.2826)	5.4169*** (1.2358)
Observations (persons)	3,790	3,790 (1,904)	3,790 (1,904)	3,790	3,790 (1,904)	3,790 (1,904)
R^2 (overall)	0.0614	0.0606	0.0351	0.0663	0.0648	0.0017

Notes: Robust standard errors in parentheses. All wages are divided by 1,000.

4.6.2.2 Firm Level

In the previous chapter, it has been investigated whether managers compare their own wage to wages that are paid on the whole labor market. Beside this inter-firm comparison, it is not unlikely that individuals take the wages of co-workers into account as well. The relevance of these kinds of comparisons will be explored in this subsection.

The analyses are thereby restricted to managers of ten bigger firms within the chemical industry as a sufficient number of observations per year and per firm is necessary in order to compute reference wages. The results are presented in Table 4.12 to Table 4.16 following the same structure as the tables with respect to social comparisons on the market level. However, most of the coefficients are not significant, especially in the fixed-effects models. Hence, it is not possible to speak of a relevance of intra-firm social comparisons within these ten big firms.

4.6.3 Investigation of Subgroups

In the following, it will be explored whether the impact of relative income on job satisfaction is different when looking at several subgroups of the sample. As there are no hints for the relevance of status quo preferences, analyses are focused on social comparisons.

First, one might think of *gender differences* with respect to the sensitivity for reference incomes. Whereas men care especially for their relative position, there is no evidence at all that women compare their own income to those of others (see Table 4.17). Similar results reveal equivalent OLS estimations (which are not presented here in detail) and the analysis of relative differences instead of absolute differences. One explanation could be that the reference income used here might be not appropriate for women. As it is not controlled for gender within the Mincer regressions which estimate the reference income and the sample consists of male managers in the majority, these predicted earnings are virtually those of men.[36] But knowing that there are only few female managers in the chemical sector, especially on higher hierarchical levels, women may anticipate their worse career opportunities in comparison to

[36] It is not controlled for gender in the estimations since firms do not distinguish between women and men in their remuneration systems.

men. Thus, male earnings are no adequate reference incomes in order to evaluate the own job situation. A better reference point might be the average income of women with equivalent characteristics. Therefore, new reference incomes are computed by estimating Mincer regressions with an additional gender dummy. However, when using these earnings as reference wages in models (2) and (4) of Table 4.17, the coefficients remain small and far from being significant. This result allows for the conclusion that women actually do not care for other incomes. This is in line with the results of early-stage work by Mayraz, Wagner & Schupp (2009) and Mumford & Smith (2012).

Table 4.17: Social comparisons on the market level – male vs. female

	Dependent variable: job satisfaction; fixed-effects estimations			
	(1) Male	(2) Female	(3) Male	(4) Female
Total Compensation Total Comp^{ref}	0.0012 (0.0010) -0.0123** (0.0049)	0.0126** (0.0061) -0.0004 (0.0140)		
Fixed Salary Fixed Salary^{ref}			0.0051 (0.0036) -0.0268** (0.0116)	0.0215 (0.0134) -0.0037 (0.0447)
Bonus Bonus^{ref}			0.0014 (0.0022) -0.0068 (0.0087)	0.0207** (0.0097) 0.0041 (0.0337)
Observations (persons) R^2 overall	13,289 (6,718) 0.0022	1,484 (832) 0.0025	13,289 (6,718) 0.0042	1,484 (832) 0.0018

Notes: Robust standard errors in parentheses. All wages are divided by 1,000. The models are in all other respects identical to models (3) and (6) of Table 4.7.

Table 4.18: Social comparisons on the market level – firm size classes

	Dependent variable: job satisfaction; fixed-effects estimations					
	(1) ≤1,000 emp.	(2) 1-10,000 emp.	(3) >10,000 emp.	(4) ≤1,000 emp.	(5) 1-10,000 emp.	(6) >10,000 emp.
Total Comp Total Comp^{ref}	0.0047 (0.0033) -0.0358*** (0.0101)	0.0036 (0.0028) -0.0173* (0.0102)	0.0001 (0.0009) -0.0144* (0.008)			
Fixed Salary Fixed Salary^{ref}				0.0047 (0.0089) -0.0305 (0.0382)	0.0094* (0.0057) -0.0144 (0.0192)	0.0054 (0.0048) 0.0112 (0.0213)
Bonus Bonus^{ref}				0.0024 (0.0043) -0.0744 (0.0559)	0.0059 (0.0040) -0.0312 (0.0208)	0.0008 (0.0032) -0.0496*** (0.0190)
Obs. (persons) R^2 (overall)	2,771 (1,622) 0.0049	5,147 (2,890) 0.0047	6,915 (3,633) 0.0031	2,771 (1,622) 0.0048	5,147 (2,890) 0.0102	6,915 (3,633) 0.0056

Notes: Robust standard errors in parentheses. All wages are divided by 1,000. The models are in all other respects identical to models (3) and (6) of Table 4.7.

It is also differentiated between *firm size categories*, see Table 4.18 for the results. Within the different models, the sample is restricted to managers of the respective firm size category. These show a remarkable pattern: Managers in smaller firms with up to 1,000 employees seem to compare themselves more to the market than executives in bigger plants do. The coefficients of reference wages are larger than in firms with more employees, even though they

are not significant in the case of fixed salaries and bonuses. This result holds true when relative differences are explored.

It has also been tested whether there are any *differences between managers at the beginning of their career and older executives*. One might think that younger managers are more focused on their career opportunities rather than on their relative income. However, the results did not reveal any considerable differences. Another idea might be that managers with a *different education* (e.g. in business or economics) are more or less influenced in their job satisfaction by the income of their peers. Up to now, only persons with a university degree in natural sciences and engineering were in the sample as these managers represent almost 90 percent of the data. When looking at managers with an education in business or economics and defining their reference group as managers with the same education, the results with respect to social comparisons are far from being significant. The main reason for that should be the small sample size of roughly 800 observations.

4.7 Summary and Discussion

In the traditional view of economics, individuals are egoistic and exclusively care about their own income. However, several approaches in the field of behavioral economics suggest that workers also take certain monetary reference points into account when evaluating their income situation. Using a unique dataset of executives in the German chemical sector, the relevance of two possible reference points has been explored: the wage from the previous one year (status quo preferences) and the wages of comparable managers (social comparisons). There is no evidence for the relevance of status quo preferences amongst the executives in the German chemical sector. They do not seem to care about wage increases, but rather about the current remuneration they get. One explanation could be that managers already expect these increases or decreases. They know from experience that their employer raises fixed salaries every year by a certain percentage.[37] With respect to bonuses, managers might anticipate lower payments due to a worse general economic situation, for instance. In consequence, the size of wage differences between two subsequent years is not surprising for managers and, thus, has no impact on their job satisfaction.

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[37] Only 11 percent of the managers in the sample have a decrease in their fixed salaries. For only 4 percent of managers, the decrease is more than 5 percent.

In contrast, the results show that social comparison processes are important for the utility of work. Hence, next to the absolute wage payment which exerts a positive influence on job satisfaction, managers also take the income of others in account when evaluating their own situation. This effect, though, is only significant with respect to comparisons on the market level, but not when comparison processes on the firm level are investigated. The effect on the market level remains robust in analyses of absolute and relative differences between own salaries and reference wages as well as in analyses of the individual wage rank within a reference group.

Analyzing intra-firm comparison processes within ten bigger firms did not show any significant results. Several reasons come to mind: First, this could simply be due to a small sample size. Second, the variation with respect to wages on the firm level is considerably smaller than on the market level: Whereas the average deviation from the computed reference total compensation is +2.6 percent[38] on the market level, it is only +0.9 percent on the firm level. But when managers earn almost the same as the reference income, it is difficult to find considerable effects of deviations on satisfaction. Third, it may be the case that the wages of colleagues are simply not known to the managers. Fourth, the reference groups within the firms may not be specific enough. In most cases, firms have more than four levels within their remuneration system. Hence, the use of only four hierarchical levels which are harmonized across the whole industry may lead to reference groups which, in terms of their definition, are not narrow enough to capture the actual situation on the firm level. If this is the case and, for example, the fourth VAA level combines two wage stages in the system of a certain firm, the computed reference wage is then located somewhere between these two levels. It is obvious that this wage would not be a sensible proxy for the actual intra-firm reference point of managers. Unfortunately, information concerning wage levels within firms is incomplete and not surveyed systematically. Moreover, the structure of remuneration systems is only known in some cases. It therefore remains a task for future research to investigate intra-firm comparison processes with more adequate data.

The investigation of different subgroups revealed considerable gender differences as there are no significant effects of reference wages on job satisfaction of female managers at all. It has

[38] Computed as the average difference between the logarithmized own total compensation and the logarithmized reference total compensation.

been explored whether this might be due to an operationalization of reference incomes that is not adequate for female managers, but there were no hints for this reason. Another explanation might be gender differences with respect to competitive behavior. There are some indications in the literature that women are less willing than men to compete with others (Niederle & Vesterlund, 2007; Price, 2008). Income comparisons itself, however, are some kind of competition which may explain their missing relevance in the case of female managers.

The relevance of social comparisons is higher for managers who work for smaller firms. Especially as executives on higher hierarchical levels, those managers have fewer adequate reference persons within the own firm. Maybe because of that, they rather look at the outside labor market in order to evaluate their market value or to investigate their outside options. In contrast, managers in larger firms should compare themselves to a larger extent with co-workers since it is more likely that there are comparable people in the same establishment. The results for social comparisons within firms, however, cannot confirm this as discussed above.

At last, one has to address the economic significance of the statistically significant results. It has been shown that the impact of deviations from the reference point is small. A difference of 10,000 € leads to effects on job satisfaction of only 0.1 points (total compensation) and 0.3 points (fixed salaries). Compared to other working conditions, this impact is low. For instance, a promotion from level 4 to level 3 leads to an increase in satisfaction of about 0.4 points which is independent from the additional positive effect of a wage increase that usually goes along with a promotion. The effect of an employer change is even more pronounced: At least for the very small sample of 108 observations (see footnote 33), the impact is almost 2 points of job satisfaction. Even though the causality and possible endogeneity problems (Does the employer change lead to a higher job satisfaction? Or were those managers already dissatisfied before moving to another firm?) are up for debate, the size of the effect is considerably higher than those of social comparisons.

One explanation for this discrepancy in the size of effects could be that executives and managers are on a rather high income level. Usually, they do not need to worry about their own personal financial and economic situation. Therefore, other aspects of the job are of higher importance for their well-being at work. This would explain the low effect for both the absolute income and also the relative income (with respect to the hitherto status quo and social comparisons). In addition, the results may be interpreted in the way that managers simply do

not know or are even not interested in how much others in the market or in their firm earn as they are rather fine with their remuneration. This could explain the low impact of both the own and the reference wages on job satisfaction as a measure of the overall utility gained from work.

It seems that the result of small effects is not unique for this rather selective sample of executives in the German chemical sector. Clark, Kristensen & Westergård-Nielsen (2009b), who explore representative and administrative data from Denmark, also find rather small impacts of average earnings paid in the firm of individuals on their satisfaction level. In their view, this "is typical in subjective data, where the dependent variable is often tightly distributed" (Clark, Kristensen & Westergård-Nielsen, 2009b, p. 439). An indication that the assessment of other, more income-related measures of utility would lead to higher effects provides the contribution of Boes, Staub & Winkelmann (2010). They make use of a GSOEP question that asks about individual´s satisfaction with pay and find considerable higher effects of income. However, when discussing the overall economic importance of reference wages, it seems to be more appropriate to make use of a measure of overall job satisfaction. Future research should focus more on this question of economic significance. Up to now, it is not possible to draw a clear conclusion as the majority of other contributions apply ordered probit models which inhibits comparisons of effect sizes. It would be interesting to analyze the relevance of comparisons to both the own previous status quo and a certain reference group in a joint analysis with other data, such as household panels like the GSOEP or the administrative data from Denmark used by Clark, Kristensen & Westergård-Nielsen (2009b). It would then be possible to compare the results of this chapter on the group of managers to results on other employee groups. Moreover, one could extend the analysis to the satisfaction with pay.

Even though intra-firm processes have also been explored, the focus in this chapter was on employee´s perspective. On the base of job satisfaction, it is difficult to make inferences for wage policies of firms, since the connection between job satisfaction and consequences for the behavior of employees such as lowering productivity or quitting the firm seems not straightforward. On the one hand, employees who earn less than others might understand this as a signal by the supervisor or by the firm that they underperformed previously, leading to an increase of productivity afterwards not to lose career opportunities within their firm. On the other hand, this situation could be seen as a relative deprivation, leading to resigning employees or, in the case of comparisons on the labor market level, to managers that explore their

outside options. Some studies analyze other economic effects of earning less than others. However, it is difficult to assign their results to managers as these studies are either laboratory experiments or analyze other groups of employees (see chapter 4.3 for an overview). One exception is the work by Ockenfels, Sliwka & Werner (2010) that is described in chapter 4.3.2. The authors find a negative effect of a higher fraction of managers with a bonus percentage below 100 percent within a department on the performance rating of the supervisor in the subsequent year. As supervisor´s performance is supposed to be influenced by the performance of the direct subordinates, it is assumed that the negative effect is due to a decreased performance of those managers with a bonus percentage below 100 percent in the previous year. However, this is a rather indirect approach. With additional waves of the survey in the future that builds up the dataset used in this chapter, it may be possible to investigate other effects such as quit behavior in more detail.

5 Summary

Several research questions were tackled within the thesis at hand. In chapter 2, **participation of German employees in further training** during a long time span of 20 years (1989 to 2008) was analyzed by exploring representative data of the GSOEP. The focus was on individual as well as job- and firm-specific factors that determine training participation. The average rate of annual training participation during this time is 19.7 percent, rising from 16.5 percent in 1989 to 23.5 percent in 2008. East German employees have considerably higher training rates than West Germans after the reunification which is interpreted as an adaption process to the market economy. The results of a random-effects bivariate probit model show that there are several determinants which exert a significant influence on the probability of being trained. Marginal effects have been computed in order to explore their relative relevance. It turned out that the probability is influenced in the most pronounced way by being a foreigner (seven percentage points lower than for Germans), the job status (e.g. 17 percentage points higher for highly qualified white-collar workers compared to unskilled blue-collar workers), and firm size (nine points higher for workers in firms with at least 2,000 employees compared to those in smaller firms with less than 20 employees).

When investigating single years instead of the whole span of 20 years, considerable differences do not reveal. Hence, the determinants of training are rather stable over time. Moreover, a multinomial model which divides training participation into courses teaching general skills and knowledge that can also be used in other firms and courses with firm-specific contents was conducted. The determinants of both kinds of human capital investments, however, do not differ significantly. This is interpreted as a confirmation of Lazear´s skill-weights approach. Its main idea is that there are no skills and knowledge which are completely firm-specific. Different firms, however, use different combinations of these skills so that rather the entire set of skills is specific to a certain firm, not a single skill itself. Consequently, decisions of firms with respect to further training seem to be less about the specificity of contents, but rather about whom to train.

Subsequently, **the impact on individual earnings due to a switch from wage-employment to self-employment** was investigated. Previous studies from the US found significant lower incomes of the self-employed compared to the earnings of the wage-employed. Within this chapter, GSOEP data from 1984 to 2008 was used to analyze the German case. In a cross-sectional view, the self-employed earn on average considerably more than the wage-

employed. The difference is smaller but still exists when looking at the median instead of the mean. This is due to a higher income variance in self-employment as well as due to some entrepreneurs with a very high income. Moreover, workers that move into self-employment have a considerable increase of their personal income, compared to what they earned before in wage-employment.

These descriptive results could be confirmed by multivariate estimations which controls for other factors that are supposed to influence earnings and earnings increases as well. A fixed-effects model that controls for unobserved heterogeneity revealed a positive and significant income effect of around 10 percent when switching from wage-employment to self-employment. There are considerable differences when looking at subgroups: Women do not benefit financially from self-employment, whereas the income effect for foreign workers is three times as large as the effect for German workers. East German workers suffer from income decreases due to switches into an entrepreneurial occupation. This effect is particularly strong directly after the German reunification. Several explanations for differences between groups were discussed. One main reason might be the distinction between necessity entrepreneurs (becoming self-employed because of the lack of other job possibilities) and opportunity entrepreneurs (becoming self-employed because of a unique business idea). The data, however, did not allow for distinguishing methodologically between these two kinds of entrepreneurs. At last, differences in the results between the US and Germany were discussed. First, opportunity costs of becoming self-employed seem to be considerably higher in Germany as workers usually leave at least partly the social security system which is rather extensive compared to the US. Moreover, public opinion about entrepreneurship is better in the US. Second, other studies showed that the structure of self-employment is different: Whereas in Germany the majority of the self-employed runs well-established businesses, US entrepreneurs are more often on an early stage. Overall, it was concluded that German workers think more about the decision on whether they should become self-employed which fosters the success of new businesses.

In the last part of thesis, **monetary reference points of managers** were explored. In the view of neoclassical economics, individuals solely care for their own current income. In contrast to that, behavioral economists postulate that people also take certain reference points into account. Within this chapter, the relevance of two reference points that are widely discussed in the literature was analyzed: Own wages of the previous year (as the hitherto status quo) and

reference wages of similar employees and co-workers (social comparisons). A unique dataset of managers and executives of the German chemical industry was used to analyze whether previous wages and/or wages of reference persons exert an influence on job satisfaction (as a proxy for the utility from work). There is no effect of previous wages, neither in cross-sectional nor in random-effects or fixed-effects models which is true for total compensation, fixed salaries, and bonus payments. Hence, there are no indications for any status quo preferences of managers in the chemical sector of Germany.

In a second step, the relevance of social comparisons was investigated. Estimating Mincer-type wage regressions led to reference wages that indicate those wages managers would earn on average on the whole labor market respectively in their firms, given their specific characteristics. The multivariate analyses show that job satisfaction is negatively correlated with market level reference wages, holding the own wage constant. This is true for total compensation and fixed salaries, while the effect for bonus payments is not significant. The effects remain robust when it is additionally controlled for unobserved heterogeneity in fixed-effects estimations. Looking at the firm level, there are no significant results with respect to the relevance of social comparisons. This was explained by a small sample size and missing transparency in terms of average wage levels within firms. Investigations of subgroups of managers show that women do not care for the wages of other managers at all, whereas men´s satisfaction is significantly influenced. One explanation might be differences in competitive behavior. Furthermore, effects of market level reference wages on job satisfaction of executives in smaller firms are higher than for managers in larger firms. This was explained by fewer intra-firm career opportunities for managers in smaller firms what may lead to a higher importance of outside options on the entire labor market. Overall, the wage effects on job satisfaction were rather small so that the chapter closed with a claim for a more intense discussion about the economic significance of reference wages.

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Appendix

Table A 1: Variable definitions and operationalizations chapter 2

Variable	Description
Participation in further training	Dummy for an employee who has attended at least one formal course in the 12 month prior to the interview
Participation in firm-specific vs. general further training	Categorical variable which differentiate between an employee (1) who has not participated in further training, (2) who has participated in firm-specific training and (3) who has participated in general training. The wording of the GSOEP question is: "To what extent could you use the newly acquired skills if you got a new job in a different company?" Answer categories "not at all" and "only to a limited extent" are interpreted as firm-specific training, answer categories "for the most part" and "completely" as general training
Age	Current age of the employee (in years)
Female	Dummy for a female employee
Foreigner	Dummy for an employee who is not German by nationality
Residence in East Germany	Dummy for an employee who lives in East Germany (including Berlin)
Years of schooling	Years of education at school and university (generated by the GSOEP team of DIW, Berlin)
Job status	Dummies for different categories of blue-collar and white-collar workers, differentiated by the position within the firm hierarchy and the skill requirements on the job. The detailed categories are: (1) Untrained blue-collar workers, (2) semi-trained blue-collar workers, (3) trained blue-collar workers, (4) foreman, team leader, (5) white-collar workers with simple tasks, (6) qualified professional and (7) highly qualified professional or managerial position. The variable is generated by the GSOEP
Tenure	Tenure with the actual employer (in years)
Limited work contract	Dummy for an employee with a limited work contract
Weekly working time	Actual working time per week (in hours)

Firm size	Dummies for the size of the actual firm in which the employee is working. As a proxy, the number of employees of the firm is used. There are four different classes: (1) Up to 19 employees, (2) 20 to 199 employees, (3) 200 to 1,999 employees and (4) at least 2,000 employees. The variable is generated by the GSOEP
Industry	Dummies for the industry of the firm. There are dummies for agriculture (NACE 1 to 14), manufacturing (NACE 15 to 44, 96, 97, 100), construction (NACE 45), retail/tourism/transportation (NACE 50 to 64), financial/corporate services (NACE 65 to 74) and public/private services (NACE 75 to 95, 98, 99)
Year	Dummies for the year of observation

Table A 2: Determinants of further training – probit vs. logit (pooled)

	Random-effects binary logit Participation in training (1=yes)	Random-effects binary probit Participation in training (1=yes)
Age	0.066*** (0.021)	0.038*** (0.012)
Age² x 100	-0.001*** (0.000)	-0.070*** (0.014)
Female	-0.263*** (0.071)	-0.151*** (0.040)
Foreigner	-0.891*** (0.118)	-0.487*** (0.064)
Residence in East Germany	0.223*** (0.069)	0.127*** (0.039)
Job status	---	
Untrained blue-collar worker	-2.569*** (0.334)	-1.325*** (0.163)
Semi-trained blue-collar worker	-1.752*** (0.151)	-0.948*** (0.082)
Trained blue-collar worker	-0.822*** (0.118)	-0.462*** (0.067)
Foreman, team leader	---	---
White-collar worker with simple tasks	-0.359*** (0.138)	-0.202*** (0.078)
Qualified professional	0.287** (0.120)	0.167** (0.068)
Highly qualified professional or managerial position	0.581*** (0.126)	0.338*** (0.072)
Years of schooling	0.073*** (0.014)	0.043*** (0.008)
Tenure (in years)	-0.025*** (0.009)	-0.014*** (0.005)
Tenure² x 100	0.001*** (0.000)	0.046*** (0.015)
Actual work time per week	0.013*** (0.003)	0.007*** (0.002)
Limited work contract	-0.307** (0.145)	-0.169** (0.081)
Firm size		
Up to 19 employees	-0.048 (0.074)	-0.024 (0.042)
20-199 employees	---	---
200-1999 employees	0.380*** (0.074)	0.217*** (0.042)
At least 2000 employees	0.707*** (0.075)	0.404*** (0.042)
Industry		
Agriculture	-0.357*** (0.111)	-0.019 (0.104)
Manufacturing	---	---
Construction	-0.357*** (0.111)	-0.201*** (0.062)
Retail/Tourism/Transportation	-0.129* (0.076)	-0.069 (0.043)
Financial/Corporate Services	0.255*** (0.086)	0.150*** (0.050)
Public and Private Services	0.645*** (0.092)	0.370*** (0.052)
Year		
1989	0.253*** (0.094)	-0.121** (0.054)
1993	0.214** (0.096)	0.024 (0.045)
2000	---	---
2004	0.215** (0.093)	0.001 (0.041)
2008	0.466*** (0.093)	0.146*** (0.042)
Intercept	-3.929*** (0.472)	-2.153*** (0.267)
Observations (persons)	18,375 (10,363)	18,375 (10,363)
McFadden Pseudo-R²	0.12	0.12

Notes: Robust standard errors in parentheses. Marginal effects are calculated at the means of other independent variables.

Table A 3: Determinants of further training – logit (single years)

	Binary logit (1=yes)				
	(1)	(2)	(3)	(4)	(5)
	1989 (West)	1993	2000	2004	2008
Age	-0.043 (0.060)	0.069 (0.051)	0.010 (0.051)	0.123*** (0.045)	0.043 (0.043)
Age² x 100	0.000 (0.001)	-0.001* (0.001)	-0.001 (0.001)	-0.002*** (0.001)	-0.001 (0.001)
Female	-0.241 (0.197)	-0.182 (0.160)	0.075 (0.164)	-0.515*** (0.137)	-0.059 (0.137)
Foreigner	-0.257 (0.361)	-1.439*** (0.340)	-0.731** (0.330)	-0.559** (0.257)	-0.391 (0.295)
Residence in East Germany		0.488*** (0.137)	0.221 (0.157)	0.312** (0.139)	-0.091 (0.140)
Job status					
Untrained blue-collar worker	-4.263*** -1058	-2.908*** -1029	-1.975*** (0.680)	-1.488** (0.603)	-3.645*** -1035
Semi-trained blue-collar worker	-2.159*** (0.504)	-1.291*** (0.315)	-1.749*** (0.362)	-1.479*** (0.392)	-1.444*** (0.371)
Trained blue-collar worker	-0.629* (0.329)	-0.578** (0.245)	-1.210*** (0.278)	-0.689*** (0.254)	-0.745*** (0.265)
Foreman, team leader					
White-collar worker with simple tasks	-0.516 (0.418)	-0.306 (0.302)	-0.797** (0.348)	-0.185 (0.291)	-0.369 (0.298)
Qualified professional	0.510 (0.321)	0.164 (0.248)	-0.198 (0.272)	0.227 (0.245)	0.107 (0.263)
Highly qualified professional or managerial position	0.888*** (0.343)	0.404 (0.258)	-0.062 (0.297)	0.419 (0.263)	0.384 (0.282)
Years of schooling	0.038 (0.036)	0.097*** (0.031)	0.078** (0.032)	0.071** (0.029)	0.078*** (0.029)
Tenure (in years)	0.009 (0.026)	0.007 (0.020)	0.008 (0.021)	-0.033* (0.018)	0.017 (0.018)
Tenure² x 100	-0.000 (0.001)	0.000 (0.001)	-0.000 (0.001)	0.001* (0.001)	-0.000 (0.001)
Actual working time per week	0.012 (0.008)	0.015* (0.008)	0.007 (0.007)	0.008 (0.006)	0.020*** (0.006)
Limited work contract	-0.359 (0.435)	0.288 (0.389)	-0.501 (0.350)	-0.400 (0.274)	-0.927** (0.386)
Firm size					
Up to 19 employees	0.030 (0.222)	-0.034 (0.196)	-0.090 (0.180)	0.220 (0.154)	0.034 (0.161)
20-199 employees					
200-1999 employees	0.270 (0.207)	0.303* (0.165)	0.167 (0.193)	0.329** (0.160)	0.268* (0.157)
At least 2000 employees	0.532*** (0.201)	0.934*** (0.167)	0.571*** (0.175)	0.737*** (0.155)	0.433*** (0.152)
Industry					
Agriculture	-1.140 (1.042)	-0.535* (0.295)	0.307 (0.402)	-0.604 (0.371)	-0.084 (0.520)
Manufacturing					
Construction	-0.210 (0.317)	-0.454** (0.204)	-0.631* (0.343)	-0.424** (0.215)	-0.274 (0.235)
Retail/Tourism/Transportation	0.254 (0.221)	-0.007 (0.178)	-0.145 (0.190)	-0.213 (0.165)	-0.132 (0.162)
Financial/Corporate Services	0.566*** (0.218)	0.486** (0.198)	0.279 (0.203)	0.369** (0.172)	0.095 (0.174)
Public and Private Services	0.427 (0.305)	0.153 (0.252)	0.217 (0.216)	0.581*** (0.167)	0.619*** (0.184)
Intercept	-1.205 (1.261)	-4.124*** (1128)	-1.709 (1.139)	-4.296*** (1.056)	-3.482*** (0.984)
Observations	2,502	3,693	3,332	4,491	4,356
McFadden Pseudo-R²	0.17	0.16	0.13	0.13	0.13

Notes: Robust standard errors in parentheses. The results are calculated with cross-sectional weights.

Table A 4: Determinants of further training – ordered probit (pooled)

	Random-effects ordered probit Number of courses
Age	0.037*** (0.011)
Age² x 100	-0.001*** (0.000)
Female	-0.148*** (0.038)
Foreigner	-0.483*** (0.062)
Residence in East Germany	0.098*** (0.037)
Job status	
Untrained blue-collar worker	-1.318*** (0.158)
Semi-trained blue-collar worker	-0.919*** (0.078)
Trained blue-collar worker	-0.456*** (0.064)
Foreman, team leader	
White-collar worker with simple tasks	-0.214*** (0.075)
Qualified professional	0.149** (0.065)
Highly qualified professional or managerial position	0.316*** (0.068)
Years of schooling	0.042*** (0.008)
Tenure (in years)	-0.014*** (0.005)
Tenure² x 100	0.000*** (0.000)
Actual work time per week	0.007*** (0.002)
Limited work contract	-0.119 (0.076)
Firm size	
Up to 19 employees	-0.011 (0.040)
20-199 employees	
200-1999 employees	0.218*** (0.040)
At least 2000 employees	0.393*** (0.040)
Industry	
Agriculture	-0.030 (0.100)
Manufacturing	
Construction	-0.186*** (0.059)
Retail/Tourism/Transportation	-0.034 (0.041)
Financial/Corporate Services	0.153*** (0.047)
Public and Private Services	0.379*** (0.049)
Year	
1989	-0.124** (0.051)
1993	0.011 (0.042)
2000	---
2004	-0.013 (0.038)
2008	0.142*** (0.039
Observations (persons)	18,375 (10,363)

Notes: Robust standard errors in parentheses.

Table A 5: Determinants of specific and general further training (pooled)

	Multinomial probit (base= no training)	
	firm-specific	general
Age	0.038** (0.019)	0.053*** (0.015)
Age² x 100	-0.065*** (0.023)	-0.091*** (0.019)
Female	-0.314*** (0.058)	-0.068 (0.049)
Foreigner	-0.469*** (0.100)	-0.525*** (0.086)
Residence in East Germany	0.184*** (0.054)	0.092** (0.046)
Job status		
Untrained blue-collar worker	-1.049*** (0.257)	-1.645*** (0.243)
Semi-trained blue-collar worker	-0.716*** (0.125)	-1.257*** (0.110)
Trained blue-collar worker	-0.306*** (0.104)	-0.597*** (0.085)
Foreman, team leader	---	---
White-collar worker with simple tasks	-0.066 (0.121)	-0.394*** (0.100)
Qualified professional	0.218** (0.105)	0.105 (0.086)
Highly qualified professional or managerial position	0.235** (0.111)	0.353*** (0.090)
Years of schooling	0.037*** (0.012)	0.042*** (0.010)
Tenure (in years)	-0.008 (0.008)	-0.055*** (0.020)
Tenure² x 100	0.037 (0.023)	0.001*** (0.000)
Actual work time per week	0.003 (0.003)	0.011*** (0.002)
Limited work contract	-0.274** (0.136)	-0.134 (0.107)
Firm size		
Up to 19 employees	-0.024 (0.067)	0.025 (0.053)
20-199 employees	---	---
200-1999 employees	0.352*** (0.065)	0.189*** (0.054)
At least 2000 employees	0.693*** (0.063)	0.413*** (0.053)
Industry		
Agriculture	0.330** (0.134)	-0.187 (0.137)
Manufacturing	---	---
Construction	-0.228** (0.100)	-0.191** (0.078)
Retail/Tourism/Transportation	-0.020 (0.064)	-0.130** (0.054)
Financial/Corporate Services	0.138* (0.073)	0.181*** (0.060)
Public and Private Services	0.419*** (0.077)	0.413*** (0.064)
Year		
1993	-0.157** (0.073)	-0.028 (0.059)
2000	---	---
2004	0.054 (0.064)	-0.024 (0.054)
2008	0.182*** (0.064)	0.144*** (0.054)
Intercept	-3.105*** (0.420)	-2.867*** (0.349)
Observations	15,777	

Notes: Robust standard errors in parentheses.

Table A 6: Variable definitions and operationalizations chapter 3

Variable	Description
Self-Employed	Dummy for a self-employed worker
Monthly Earnings	Monthly Earnings in Euro of prices in 2008
Female	Dummy for a female worker
Foreigner	Dummy for a worker who is not German by nationality
Children in household	Dummy for a worker with at least one child under the age of 16 in her/his household
Age	Current age of the worker (in years)
Years of schooling	Years of education at school and university (7 = no schooling degree, 18 = university degree)
Unemployment experience	Cumulated months of unemployment during the whole working life
In occupation trained for	Dummy for a worker whose occupation is the same in which she/he was trained
In public sector	Dummy for a worker whose occupation is in the public sector
Firm size	Dummies for the size of the actual firm in which the worker is occupied. As a proxy, the number of employees of the firm is used. There are four different categories: (1) Up to 19 employees, (2) 20 to 199 employees, (3) 200 to 1,999 employees and (4) at least 2,000 employees
Tenure	Tenure with the actual firm (in years)
Weekly working time	Actual working time per week (in hours)
Industry	Dummies for the industry of the firm. There are dummies for agriculture (NACE 1 to 14), manufacturing (NACE 15 to 44, 96, 97, 100), construction (NACE 45), retail/tourism/transportation (NACE 50 to 64), financial/corporate services (NACE 65 to 74) and public/private services (NACE 75 to 95, 98, 99)
Year of observations	Dummies for the years of observation

Table A 7: Variable definitions and operationalizations chapter 4

Variable	Description
Job satisfaction	Overall satisfaction with the job, measured on a 11-digit scale from 0 (totally unhappy) to 10 (totally happy)
Total Compensation	Gross annual total monetary compensation in 1,000 Euro. Computed as the sum of fixed salaries, bonus payments and other income components (such as exercises stock options, inventors´ gratuities or jubilee payments)
Fixed Salaries	Gross annual fixed salaries in 1,000 Euro, guaranteed by the work contract
Bonus Payments	Gross annual bonus payments in 1,000 Euro
Reference Total Compensation (Fixed Salaries, Bonus Payments)	Average gross annual total monetary compensation (fixed salaries, bonus payments) in 1,000 Euro of a reference group. *Regarding social comparisons on the market level:* managers with the same work experience in the same firm size on the same hierarchical level in the same year. *Regarding social comparisons on the firm level:* managers with the same work experience on the same hierarchical level in the same firm in the same year
Female	Dummy for females (1=yes)
In Relationship	Dummy for being in a relationship (1=yes)
Children in household	Dummy for minor child(ren) in household
Distance to workplace	One-way distance to the workplace in kilometers
Tenure	Tenure with the firm in years
Experience	Work experience, measured by the years since graduation
Firm size	Dummies for the size of the actual firm in which the manager is occupied. As a proxy, the number of employees of the firm is used. There are eight different categories: (1) Up to 100 employees, (2) 101-300 employees, (3) 301-1,000 employees, (4) 1,001-2,000 employees, (5) 2,001-5,000 employees, (6) 5,001-10,000 employees, (7) 10,001-30,000 employee and (8) at least 30,001 employees
Hierarchical Level	Dummies for the hierarchical level on which the managers works. Within the questionnaire, respondents are asked to allocate them to one of four management levels, whereas level 1 represents the top-management level
Year	Dummies for the observation year

Table A 8: Interpretation of semi-loglinear models

Consider a simple estimation model which is described by

$$y = \beta_1 + \beta_2 \cdot \log(x_1)$$

Now assume that x_1 is increased by one percent:

$$x_{1b} = x_{1a} \cdot 1.01$$

The effect on y is the difference between y_b and y_a:

$$y_b - y_a = (\beta_1 + \beta_2 \cdot \log(x_{1b})) - (\beta_1 + \beta_2 \cdot \log(x_{1a}))$$

$$y_b - y_a = (\beta_2 \cdot \log(x_{1b})) - (\beta_2 \cdot \log(x_{1a}))$$

$$y_b - y_a = \beta_2(\log(x_{1b}) - \log(x_{1a}))$$

$$y_b - y_a = \beta_2(\log(x_{1a} \cdot 1.01) - \log(x_{1a}))$$

$$y_b - y_a = \beta_2(\log(x_{1a}) + \log(1.01) - \log(x_{1a}))$$

$$y_b - y_a = \beta_2 \cdot \log(1.01)$$

For smaller values of x:

$$\log(1 + x) \approx x$$

Hence, we can approximately assume:

$$y_b - y_a \approx \beta_2 \cdot 0.01$$

Erklärung

Hiermit versichere ich, dass ich die vorliegende Dissertation selbständig und ohne unerlaubte Hilfe angefertigt und andere als die in der Dissertation angegebenen Hilfsmittel nicht benutzt habe. Alle Stellen, die wörtlich oder sinngemäß aus anderen Schriften entnommen sind, habe ich als solche kenntlich gemacht.

Duisburg, den 27.07.2012

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