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The Effects of Unpaid Overtime on Wages, Promotions, and Layoffs

Berlin, December 2005

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IMPRESSUM

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Working Time as an Investment? – The Effects of Unpaid Overtime on Wages, Promotions, and Layoffs

Silke Anger*

December 2005

Abstract

Whereas the number of paid overtime hours declined over the last two decades in Germany, a different trend can be observed for unpaid overtime. We analyze future consequences of unpaid work with respect to a worker's career advancement, such as higher future wages and probabilities of promotion or job retention, which might help to explain why an increasing fraction of employees are working extra hours for free. Data from the SOEP for the years 1993 to 2004 are used to examine whether working a higher number of unpaid extra hours involves a higher probability of promotion and excess earnings growth, and a lower probability of layoff in subsequent years. The pooled, random effects, and fixed effects logit estimates reveal limited evidence for the investment character of unpaid overtime hours with respect to future wage growth and promotions. Moreover, unpaid extra hours do not help to prevent future layoffs, except for East German women. For West German men, unpaid overtime hours are positively associated with the risk of future dismissal

Keywords:
Unpaid overtime, promotion, wage growth, layoff, labor supply

JEL Classification:
J22, J33, J41

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1. Introduction

The decline in paid overtime and the rise in unpaid overtime during the past two decades in Germany have contributed to the fact that nowadays, unpaid hours are more important than paid extra work. Both the incidence and the average amount of unpaid hours have risen, and particularly non-managerial occupations are increasingly affected by unpaid overtime.[1] Yet, the public discussion on working time is still largely characterized by its focus on paid extra hours, for which measurement is simpler and for which information is available from official statistics. As more evidence is much needed to evaluate the emergence and effects of other forms of extra hours, this study investigates future consequences of unpaid overtime. In particular, the link between a worker's current unpaid hours and his career advancement is examined. Future returns, such as pay rises and higher probabilities of promotion and job retention, might help to explain why an increasing fraction of workers supplies extra hours for free. A positive relationship between unpaid overtime and future payoffs would, furthermore, revise the picture of unpaid working hours, as they might be well compensated after all. Likewise, the study's aim is to shed light on the consequences for workers who do not invest in unpaid overtime. If workers need to put in long hours to be compensated later on in form of job retention, career advancement and wage growth, the issue might be raised whether this payment scheme puts some worker groups at a disadvantage. Workers who are constrained in their abilities to supply long hours, such as women with family obligations or workers with health problems, might be excluded from certain positions or hierarchy levels in a company and suffer relative wage losses.

The following section provides an overview on studies that investigate the investment character of overtime and summarizes theories which can explain a positive relationship between working hours and future payoffs. Section 3 describes the data, the sample, and the construction of the variables which will be used in the analysis. Section 4 provides a descriptive overview on overtime and career advancement in Germany. The empirical methods will be given in Section 5. Section 6 presents the estimation results, as well as the results of the robustness checks and of extensions of the model. Section 7 concludes.

[1] Data from the German Socio-Economic Panel Study (SOEP) shows that unpaid hours worked by clerks, and service and sales workers have substantially increased during the last two decades.

2. Unpaid Overtime and Future Payoffs

2.1. Previous Research

A first evidence on future payoffs by working longer hours is given by Bell and Freeman (2001). They compare actual working hours in the U.S. and Germany, and investigate the relationship between wage inequality and labor supply as well as the effect of actual working hours on future wages and promotion. They find that workers react to wage inequality by increasing their working hours, and that workers are more likely to expect a promotion if they worked long hours in the past. Empirical evidence for the investment character of overtime has been also provided by Booth, Francesconi, and Frank (2003) who show for the U.K. that the amount of overtime correlates with subsequent promotions in a significantly positive way. Likewise, Francesconi (2001) examines the determinants of promotions for workers in Great Britain, and finds that working one overtime hour per week increases the likelihood of promotion by 0.1% for men and 0.3% for women. However, the studies of Booth et al. (2003) and Francesconi (2001) do not differentiate between paid and unpaid overtime work. Another study for the U.K. is conducted by Campbell and Green (2002) who reveal that there are positive though diminishing long-term returns from working longer hours. Furthermore, they find that the greatest impact on payoffs stems from unpaid overtime. Bell, Gaj, Hart, Hübler, and Schwerdt (2000) reveal a positive relationship between unpaid overtime and perceived promotion prospects for workers in Great Britain. In contrast, they find no significant effects of overtime on promotions for Germany using data from the SOEP for 1997. Pannenberg (2005) uses the same dataset, and finds supportive evidence for the investment character of unpaid extra hours by investigating long-term effects of unpaid overtime in West Germany. He reveals that there are substantial long-term labor earnings effects associated with cumulative average unpaid overtime, which is evidence for the importance of investing in current working hours beyond the standard work week to enhance real earnings prospects. He shows that workers with at least some incidence of unpaid overtime experience the highest wage growth.

The objective of this empirical study is to analyze whether working hours can be interpreted as an investment for workers in East and West Germany. We investigate whether unpaid extra hours are associated with wage growth, promotion probabilities, and with the risk of losing a job. Therefore, we extend the study by Bell et al. (2000) in as much as we exploit the longitudinal character of the SOEP by using more waves of data, and as we employ an alternative measure of promotion, which will be explained in Section 3. In contrast to Pannenberg (2005) we do not concentrate on long-term effects of unpaid extra hours but focus on payoffs in the near future. This might be important, as employment relationships have become increasingly fragile within the recent years. A considerable fraction of the workforce merely enters a short-term or medium-

term contract with their employer, which implies that a compensation in the near future might be more relevant to these workers.

2.2. Theoretical Considerations

Several theories can be considered to generate the positive relationship between present working hours and future outcomes. In a simple cost minimization framework, additional productive hours in form of overtime lead firms to choose overtime workers to be promoted or retained, since they provide relatively cheap labor to the firm. This is not only true for the case of unpaid overtime, but also for the case of paid overtime, since the firm can adjust labor at the inner margin by the use of extra hours and therefore save fix cost that would arise in the case of hiring additional workers. Higher current and future wages for unpaid overtime workers might also be interpreted as a reward in the sense of gift exchange (Akerlof, 1984). Firms might pay above market wages and therefore induce workers to counteroffer a gift to the firm. This gift takes the form of long working hours in excess of the hours specified in the contract and might again be rewarded with higher than market level earnings. This leads to a positive correlation between unpaid work and wage payments. Moreover, the gift could also be given to the worker in form of more general career advancement. In addition, the human capital theory is capable of considering working hours as investment. Assuming that overtime hours are used to acquire specific human capital (Booth et al., 2003), the human capital model can explain why they yield a return later on.

Another explanation is provided by the literature of deferred compensation (Lazear, 1979), which deals with incentive provisions in long-term worker-employer relationships, in which output is difficult to measure. In order to encourage higher worker effort, optimal compensation contracts are structured in a way that workers are paid below their marginal revenue product during the early part of their career and above their productivity later on. As future pay will exceed productivity, workers are induced to put in high effort at the beginning in order to avoid their layoff. Another incentive provision results from the implementation of performance-related compensation schemes, in which firms are indifferent towards the level of working time, but reward higher output. This might induce workers to provide unpaid extra hours to receive monetary benefits, such as discrete bonuses, profit sharing, stock options, or commissions (Prendergast, 1999). Likewise, overtime workers might be more likely to be promoted due to their higher performance and overall productivity.[2] Another model that is frequently used to explain promotions is the tournament theory (Lazear, 1981), which assumes that the number of payoffs is limited. The future rewards are usually fixed in advance, and workers are not

[2] However, promotions and wage increases do not necessarily reflect worker productivity. According to the theory of strategic promotions, firms might attempt to delay promotions or pay rises of the most able workers, as career advancement would signal the high value of the worker to outside firms. The latter may be induced to make counteroffers to the worker and therefore drive up the wage. For strategic promotions, see e.g. Waldmann (1984), Bernhardt (1995), or Gibbons and Katz (1992).

necessarily remunerated according to their marginal product, as their relative performance matters, regardless of the absolute output. If the employer is indifferent to the time needed to complete certain jobs tasks, the advancement in the tournament might depend on the amount of overtime hours, which might be taken as direct measure of effort. This is the case in rat-race models (Landers, Rebitzer, and Taylor, 1996), where promotion decisions are made on the basis of long working hours, which are used as screening device for low disutility of work.

Lastly, the investment character of working time is consistent with the signaling theory, with unpaid overtime serving as signal of productivity, motivation, or loyalty to the employer. The signaling model by Spence (1973) was originally applied to the problem of asymmetric information in the job recruiting process. However, it might be extended to the post hiring period, if monitoring is difficult and if the firm has incomplete information on worker productivity. The information asymmetry might lead to decisions on career advancement being made on the basis of unpaid overtime or other characteristics which are easier to observe than productivity. Therefore, working longer hours and providing them even for free might increase the probability of pay rise and promotion and decrease the probability of layoff. If unpaid overtime is merely used to separate workers on the basis of the signal, workers might engage in competitive presenteeism (Simpson, 1998), and stay long hours in the firm in order to be seen, even if there is no extra work to do.[3]

[3] In contrast, a negative relationship between unpaid overtime hours and future payoffs might be explained by the signal of lower productivity, as low-productivity workers need longer to complete certain jobs tasks.

3. Data

3.1. Sample and Variable Description

The data used in this study were made available by the German Socio-Economic Panel Study (SOEP) at the German Institute for Economic Research (DIW) in Berlin. We use SOEP data from 1993 to 2004 for male and female East and West German full-time employees aged between 20 and 60. Workers older than 60 were dropped because their workweek might be shortened in the course of retirement plans, and working hours are unlikely to have an investment character. Furthermore, we exclude foreigners, civil servants, self-employed persons, and workers employed in the agricultural sector. Although East Germans took part in the survey since 1991, we only use the waves from 1993 on, since not all of the variables are available for the East German sample before. Respondents with missing information on promotions, dismissals, and earnings in the next period and on other crucial variables, such as working hours, are dropped. Our unbalanced panel includes only those respondents who participate in at least two subsequent waves of the survey in order to be able to control for individual unobserved heterogeneity. In total, the sub-sample consists of about 20,900 person-year observations, with 12,600 in West Germany and 8,300 in East Germany.

The SOEP provides detailed information on whether overtime is worked, on the amount of overtime hours per month and on overtime compensation.[4] We take overtime hours per week and combine it with the information on overtime compensation in order to obtain the amount of unpaid overtime hours per week which is the crucial independent variable in our study. As further control variables, we additionally include other compensation forms of overtime and contractual working time, as well as desired working hours. To control for heterogeneity between workers, we add a number of worker and firm characteristics which might potentially affect the probability of promotion, wage growth, and layoff. Therefore, we include control variables for occupations, blue-collar and white-collar workers, firm size, whether a person works in the public sector, whether he holds a temporary or a permanent position, and whether he recently changed his job. To capture a worker's motivation, we add a variable for job satisfaction to the covariates in some of the estimates. Further independent variables are age, marital status, education, work experience, and tenure. All regressions additionally include industry, region, and year dummies as controls. It is certainly important to take the economic situation of the firm into account, as promotions and pay rises as well as layoffs certainly depend

[4] The original questions in the SOEP read as follows: "*Do you work overtime?*" [Yes/No/Not applicable because I am self-employed]; "*If you work overtime, is the work paid, compensated with time-off, or not compensated at all?*" [Compensated with time-off/Partly paid, partly compensated with time-off/Paid/Not compensated at all]; "*How was your situation with regards to overtime last month? Did you work overtime? If yes, how many hours?*" [Yes, ____ hours/No].

on the firm's profits. However, since the SOEP provides no detailed firm information, we try to capture firm success by the GDP growth in the firm specific sector within a worker's region. All regressions are run separately for men and women as well as for East and West German workers. Summary statistics of the variables used in the estimates are provided in Table A1 in the Appendix.[5]

3.2. Payoff Variables

For career advancement two measures are used, job promotion and wage growth, which are quite standard in the literature on promotions (Groeneveld and Hartog, 2004). For wage growth we do not only use monthly gross earnings but also extra payments, such as Christmas bonus, holiday pay, income from profit sharing, and other bonuses, as extra payments have become increasingly important in recent years. Pierce (1999) finds that excluding extra payments from earnings tends to understate wage differentials. In the SOEP, information on extra payments are only revealed in the subsequent wave of a respective year. Therefore, the sample is considerably reduced and we cannot use observations in 2004, except for the information on extra payments. However, since these additional payments are considered to be substantial to this study, observations without this information are dropped. We construct a dummy variable for excess earnings growth as in Groeneveld and Hartog (2004) who point out that the use of dummy variables to measure career development is a strong test of the investment theory. Excess earnings growth is defined as growth, which is at least one standard deviation higher than the average earnings growth of workers in the same job scale in the respective year. Earnings averages are calculated for East and West German workers separately. In our sample, around 10% of both, East and West Germans, experience excess earnings growth between the current and the subsequent interview.

Unfortunately, the SOEP does not provide direct information on promotions, and merely includes questions on promotion expectations by the workers. Information on expected promotion is used by a number of studies not only for Germany, but also for the U.K. (Bratti and Staffolani, 2005). Bell and Freeman (2001) use expected information from the SOEP and observe that 20% of German workers expected a promotion, whereas only 10% of U.S. workers experienced a real promotion. This might hint to actual promotions being overstated, when expectation information is used. Hence, their revealed positive effects of long working hours on promotion expectations might overestimate the effects of current working time on real promotion prospects. A further drawback is that the information on subjective promotion prospects is not

[5] The sub-samples of men and women and of East and West German workers might also be analyzed in one single regression. However, since the Chow test for structural change (Greene, 2000) revealed that the regression coefficients are significantly different in the above mentioned subsets of the data, analyses are conducted by running separate regressions.

available for the years 1995, 1996, 2000, 2002, and 2004. Alternative promotion measures for SOEP data are used by Bell, Gaj, Hart, Hübler, and Schwerdt (2000). They assume workers with job changes to be promoted if they state that their chances of being promoted has been enhanced in the new job, or if there was an improvement of the workers' position within the group of blue-collar or white-collar workers. Furthermore, they consider an improvement in the job prestige indicators as promotion, but do not find significant effects for any of these promotion measures in their estimation results for data from 1997.

We slightly vary the promotion measure used by Bell et al. (2000) and construct a dummy variable for promotion by combining information on intra-firm changes with the workers' evaluations of their new positions. We consider a worker to be promoted if he changes his position within a firm and, in addition, self-rates his new position to be superior with respect to either his earnings or his tasks, or both. We do not define job changes as promotion if either earnings have decreased or if job tasks have worsened compared to the previous position. Furthermore, we use the SOEP information on four blue-collar and five white-collar job scales, and additionally define a promotion as an increase in the rank of the job scale from one year to the other. In our sample, 9% of the West German workers experienced at least one promotion between 1993 and 2004, whereas this percentage was only 6% for East Germans. Among the workers who expected a promotion, only 10% were observed to actually experience a promotion in the subsequent year according to our promotion measure. This may indicate that subjective promotion prospect are not an accurate measure for real promotion probabilities. However, promotions might be underestimated by the measure used in this study. One potential reason is attrition bias, as workers might be more likely to drop out of the survey after having experienced a promotion. However, this does not seem to be the case, as workers in our sample who expect a promotion and those without any promotion prospects are found to have a similar attrition rate. Furthermore, the respective information might suffer from recall bias. For instance, workers might have difficulties to remember a job change if the change implied only small modifications in the workplace. This might also explain the relatively low promotion rate in our sample compared to other studies,[6] as it has been shown that not all of the declared promotions in surveys are actual changes in positions. Pergamit and Veum (1999) use the National Longitudinal Survey of Youth to show that of the 24% of workers who reported a promotion during the last year, the majority experienced no change in their position. A large fraction (30%) had the same job tasks as before, or a simple "upgrade" of the position. Therefore, we should keep in mind that the promotion measure used in this study is more narrowly defined and more likely to imply major changes in the workplace. According to our promotion measure, demotions and absence of promotions are not distinguished, since demotions are a very rare event. Nor do

[6] Whereas Francesconi (2001) and Booth et al. (2003) find a yearly promotion rate of 9% for Great Britain, the promotion rate for our sample is only around 2% per year. Belzil and Bognanno (2004) even have a promotion rate of 11% in their sample of American executives.

we differentiate between promotions for more than one level in the job scale and standard promotions, where the worker just reaches the next job scale. Furthermore, we do not take into account past promotion histories, although past promotions, and in particular speed of promotion, might affect current promotion prospects. The effect of past promotion on current promotion probabilities is referred to as fast track effects in the literature, as past promotions might indicate differences in ability and also have a signaling effect. However, we are not able to take promotion histories into account, since the restriction to a balanced panel, i.e. only persons with information in all of the years, would deplete the sample size excessively. This is even more problematic, as the consideration of past promotions requires the observation of a fairly long time period, since promotion cycles have been shown to be of a relatively long duration of about seven years (Lazear, 1992).

The construction of the third dependent variable, experience of layoff, is more straightforward, since information on the ending of an employment can be combined with the stated reason for the job leave. A layoff refers to any dissolution of the employment between the last and the current interview, which was initiated by the firm and is not due to firm closure.[7] In the estimates of the layoff probability, regional unemployment rates are added to the covariates, as these may reflect the local level of labor demand (Böheim and Taylor, 2003). Therefore, unemployment rates by employment office district ("Arbeitsamtbezirk") are included. Since there are almost 180 in Germany, this variable is likely to capture the local situation on the labor market quite accurately. However, the SOEP includes a variable for the state a household lives in, but no information on smaller geographical areas in the official version of the dataset. Non-public information on the households' zip codes is available from the German Institute for Economic Research (DIW), according to which households can be assigned to their employment office districts.[8] When estimating the layoff probability, we also include information on dependent children living in the household, since this characteristics might influence the layoff decision of a firm which has to take into account social criteria as agreed with the works council. In our sample, 5% of the West German workers experienced at least one dismissal during the observation period, whereas 12% were dismissed at least once in East Germany. Whereas the explanatory variables are taken from information on the current year, the payoff variables refer to future periods. To take into account both short-term, and medium-term effects, alternative outcome variables are constructed for the event taking place in the subsequent year, within the next two years, and within the next three years.

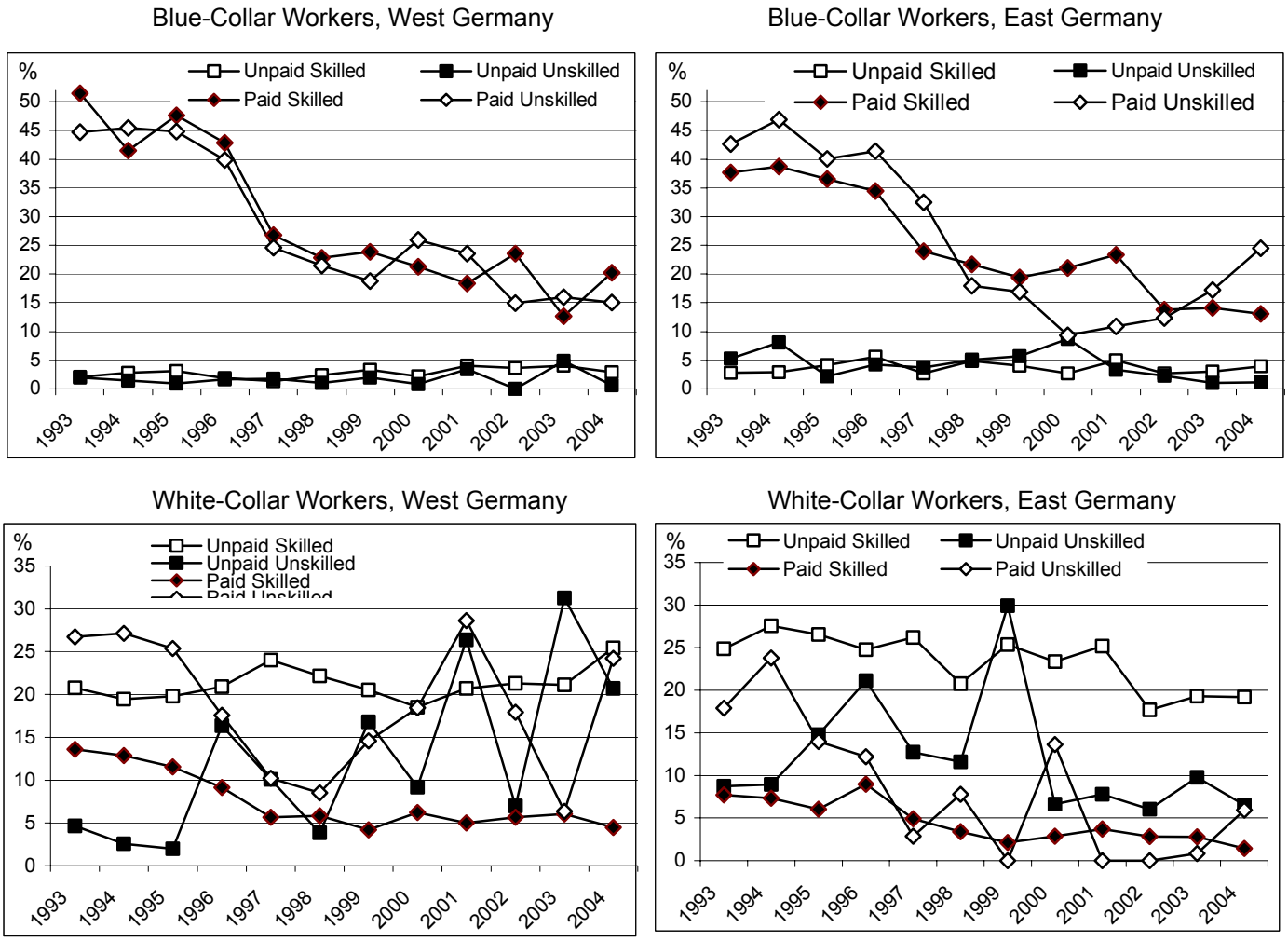
[7] There is a possibility that the distinction between layoffs and quits is not clear-cut, as some workers might try to take actions to be dismissed by their employer in order to be eligible for unemployment benefits. In the case of voluntary quits, benefits are not paid from the beginning of the unemployment spell.
[8] Due to the sensitivity of the data analysis at the zip code level, all analyses involving such data have been conducted at the German Institute for Economic Research (DIW Berlin), under special data protection requirements.

4. Trends in Paid and Unpaid Overtime

The average standard workweek of the West German workers in our sample was about 38.4 hours in 1993, and decreased only slightly during the 1990s to 38.3 hours in 2004. The following graphs and tables show time trends for paid and unpaid overtime, which differ substantially during the past decade.[9] In East Germany, the contractual working time fell from 40.1 hours to 39.5 hours, which lead to a slight narrowing of the gap. In both East and West Germany, the incidence of paid overtime has substantially fallen, whereas unpaid overtime gained relative importance. Figure 1 shows the incidence of paid and unpaid overtime for skilled and unskilled blue-collar and white-collar workers separately, since the compensation form of extra hours differs dramatically between skill groups. This might be explained by the difference in union coverage, but also by differences in job tasks and workplace characteristics. The graphs in the top panel show a sharp decline in paid extra hours for blue-collar workers during the last decade. As a percentage of the total number of employees, almost 50% of skilled and unskilled blue-collar workers reported paid overtime hours in the early 1990s, whereas this incidence was only about 20% in 2004. The fraction of blue-collar workers who perform unpaid hours has hardly changed, and is still lower than paid overtime, at a level around 5%. White-collar workers have a clearly higher incidence of unpaid hours, as can be seen in the bottom panel. The percentage of West German skilled white-collar workers with unpaid overtime remained fairly stable during the observation period, and increased only slightly to 25% in 2004, whereas the incidence of paid overtime for this worker group decreased from a level of 15% to 5% in 2004. In contrast, among unskilled white-collar workers in West Germany, the fraction of both unpaid and paid workers fluctuated rather strongly. In the early 1990s, less than 5% of all unskilled white-collar workers provided unpaid hours for free, whereas this percentage amounted to 30% in 2003, and was again reduced to 20% in 2004. Similarly, the incidence of paid overtime for this worker group has shown to be quite unstable, as it moved in the opposite direction of unpaid overtime in most of the observed years. In East Germany, skilled white-collar workers experienced a small decline in their unpaid overtime incidence, whereas the percentage of unskilled white-collar workers with unpaid hours sharply increased by the end of the 1990s, but recently returned to its previous level. In both skill groups, the fraction of workers with paid overtime declined to below 5%.

[9] All descriptive statistics are weighted using cross-sectional sample weights.

Figure 1: Paid and Unpaid Overtime Incidence According to Skill Group (1993-2004)



Source: SOEP, 1993-2004 (own calculations)
Sample: German male and female full-time employees, age 20-60, civil servants and self-employed persons excluded. The incidence refers to the percentage of all employees. Data are weighted using cross-sectional sample weights.

In addition to the fraction of unpaid overtime workers, it is important to consider the number of overtime hours. Table 1 shows how unpaid overtime in Germany is distributed among workers in different occupation groups. The numbers show that the majority of workers supplies relatively few unpaid extra hours, regardless of their occupation. The average amount of unpaid overtime hours is clearly highest for managers in both East and West Germany. Whereas in West Germany, professionals and elementary workers put in high levels of long hours, the occupation groups with a high level of unpaid overtime in East Germany are managers, plant and machine operators, and technicians. It is shown that extensive workweeks are most prevalent for managers, professionals, and elementary workers in the West. In East Germany, managers, technicians, and plant and machine operators work extremely long hours, and at a higher level than the corresponding workers in West Germany.

Table 1: Distribution of Unpaid Overtime Hours According to Occupation

	West Germany					East Germany				
	Average	Percentile				Average	Percentile			
Occupation	Hours	25 th	50 th	75 th	95 th	Hours	25 th	50 th	75 th	95 th
Managers	6.98	3.3	5.8	9.3	16.4	7.37	2.3	5.8	10.5	21.0
Professionials	6.51	3.5	4.7	9.3	17.5	5.13	1.9	4.7	7.0	14.0
Technicians	4.05	0.9	3.0	5.6	11.7	5.85	1.9	4.7	8.2	18.7
Clerks	4.02	1.2	3.0	4.7	11.7	4.78	2.3	3.7	5.8	11.7
Service/Sales Workers	4.57	1.4	3.3	6.5	14.0	5.22	1.9	3.5	7.5	14.0
Craft Workers	4.56	1.9	3.7	5.6	14.5	3.94	0.0	2.8	5.8	11.7
Plant/Machine Operators	4.40	0.9	2.8	7.0	14.0	6.80	0.0	3.5	11.7	23.1
Elementary Workers	5.99	3.3	4.7	9.3	16.4	4.67	2.3	3.5	7.0	9.3

Source: SOEP, 1993-2004 (own calculations)
Sample: German male and female full-time employees with unpaid overtime, age 20-60, civil servants and self-employed persons excluded. Data are weighted using cross-sectional sample weights.

The importance of unpaid overtime relative to all other compensation forms is shown in Table 2, which presents the fraction of workers with unpaid, paid, leisure compensated, and partially paid/partially leisure compensated overtime as percentage of all employees with extra hours. In West Germany, the fraction of unpaid overtime workers has clearly increased during the observation period, whereas a slightly decreasing fraction of overtime workers receive no compensation for their extra hours in East Germany. East and West German workers experience the common trend of a decline in paid overtime, which was reduced from a share of almost 30% in 1993 to 10% in 2004. In contrast, working time accounts are of growing importance. Leisure compensation was the most prevalent compensation form in 1993, and has an even higher share in the most recent year. However, leisure compensated extra hours are supposed to be taken as time-off at a later point in time and are hence considered as transitory overtime. Since the mid-1990s, the prevalent type of definite extra hours is clearly unpaid overtime.

Table 2: Shares of Overtime Compensation (in %)

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
West Germany												
Unpaid	0.21	0.21	0.20	0.21	0.23	0.23	0.22	0.18	0.21	0.23	0.26	0.28
Paid	0.28	0.25	0.25	0.22	0.15	0.14	0.11	0.13	0.13	0.12	0.10	0.12
Leisure	0.30	0.30	0.32	0.36	0.38	0.39	0.42	0.44	0.43	0.41	0.41	0.39
partly paid/ leisure	0.20	0.23	0.23	0.21	0.24	0.22	0.25	0.25	0.22	0.21	0.22	0.21
East Germany												
Unpaid	0.21	0.24	0.24	0.23	0.21	0.19	0.22	0.21	0.20	0.16	0.18	0.17
Paid	0.27	0.26	0.26	0.26	0.17	0.13	0.12	0.13	0.13	0.09	0.09	0.10
Leisure	0.34	0.31	0.32	0.33	0.40	0.39	0.44	0.42	0.44	0.49	0.50	0.50
partly paid/leisure	0.19	0.19	0.19	0.18	0.21	0.26	0.22	0.24	0.23	0.24	0.22	0.22

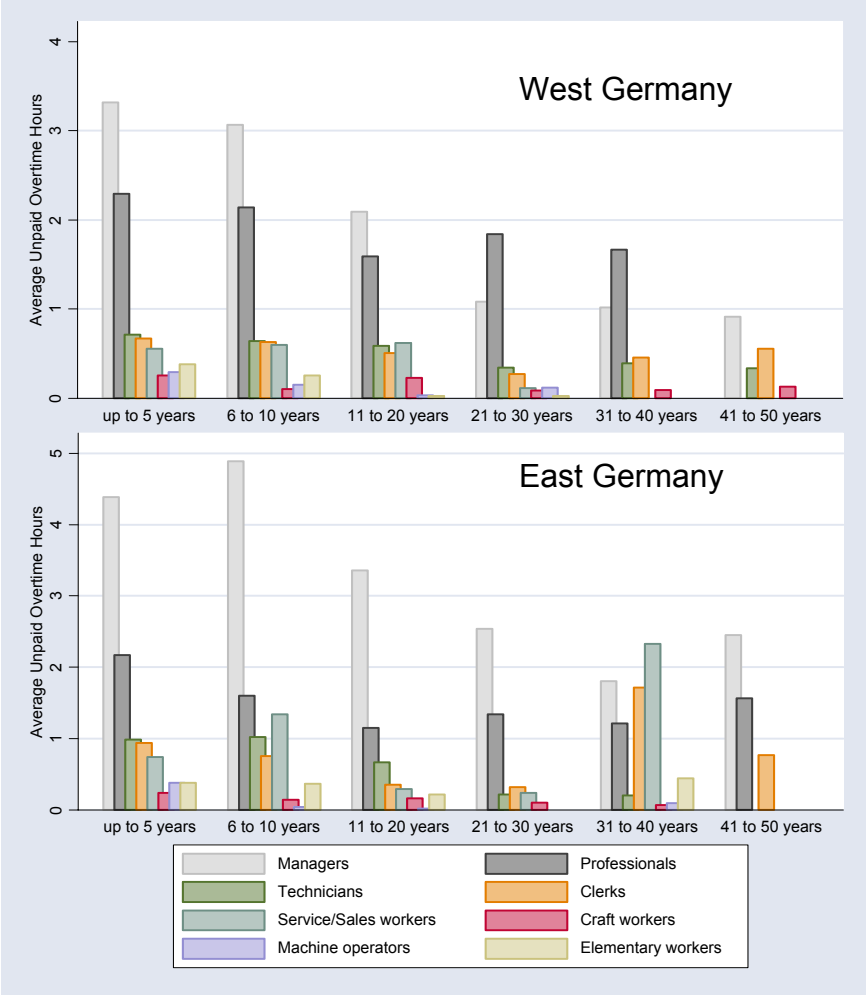
Source: SOEP, 1993-2004 (own calculations).

Sample: German male and female full-time employees working overtime, aged 20-60, civil servants and self-employed persons excluded. Data are weighted using cross-sectional sample weights.

Some of the theories discussed above, such as the theory of deferred compensation, the tournament model, or the signaling theory, predict a decline in unpaid overtime hours with increasing tenure. The use of unpaid overtime to show effort, to compete with other workers, or to signal higher productivity, might be more relevant during the first years of employment within a firm, and is stopped once the future payoff is obtained. Therefore, Figure 2 shows the amount of unpaid hours for workers in different occupations and for different lengths of job tenure averaged over all employees. The graph reveals that there is indeed a negative trend in unpaid hours with increasing spell length. This is particularly true for West German managers who work on average three unpaid hours per week at the beginning of their career, whereas the average is only one weekly overtime hour for managers with 20 or more years of tenure. In East Germany, newly employed managers perform even more unpaid hours, and increase their unpaid overtime supply up to 10 years of tenure, before average unpaid hours decline in later years. Similarly, professionals have a downward trend in unpaid hours, which is, however, by far weaker than that of managers. Clerks show an exceptionally increase in average unpaid overtime towards the end of their career, after they have been employed for 30 or more years by the same firm.

Lastly, we are interested in the descriptive evidence on the link between unpaid overtime hours and future payoffs, which will be the focus of the econometric analysis below. Figure 3 shows the fraction of workers who experience an excess growth in their labor income (left hand panel), as well as the percentage of workers who will be promoted within the three subsequent years (right hand panel). All percentages are shown for different amounts of unpaid overtime hours and different occupations. In most of the occupation groups in West Germany, workers with a positive amount of unpaid extra hours have a higher incidence of excess earnings growth, although for some worker groups the incidence is declining for excessively long hours. The strongest difference seems to arise between elementary workers with and without unpaid overtime: whereas almost 30% of workers without unpaid overtime experience excess wage growth within the three subsequent years, this percentage is already 60% for workers with up to 5 weekly unpaid hours.

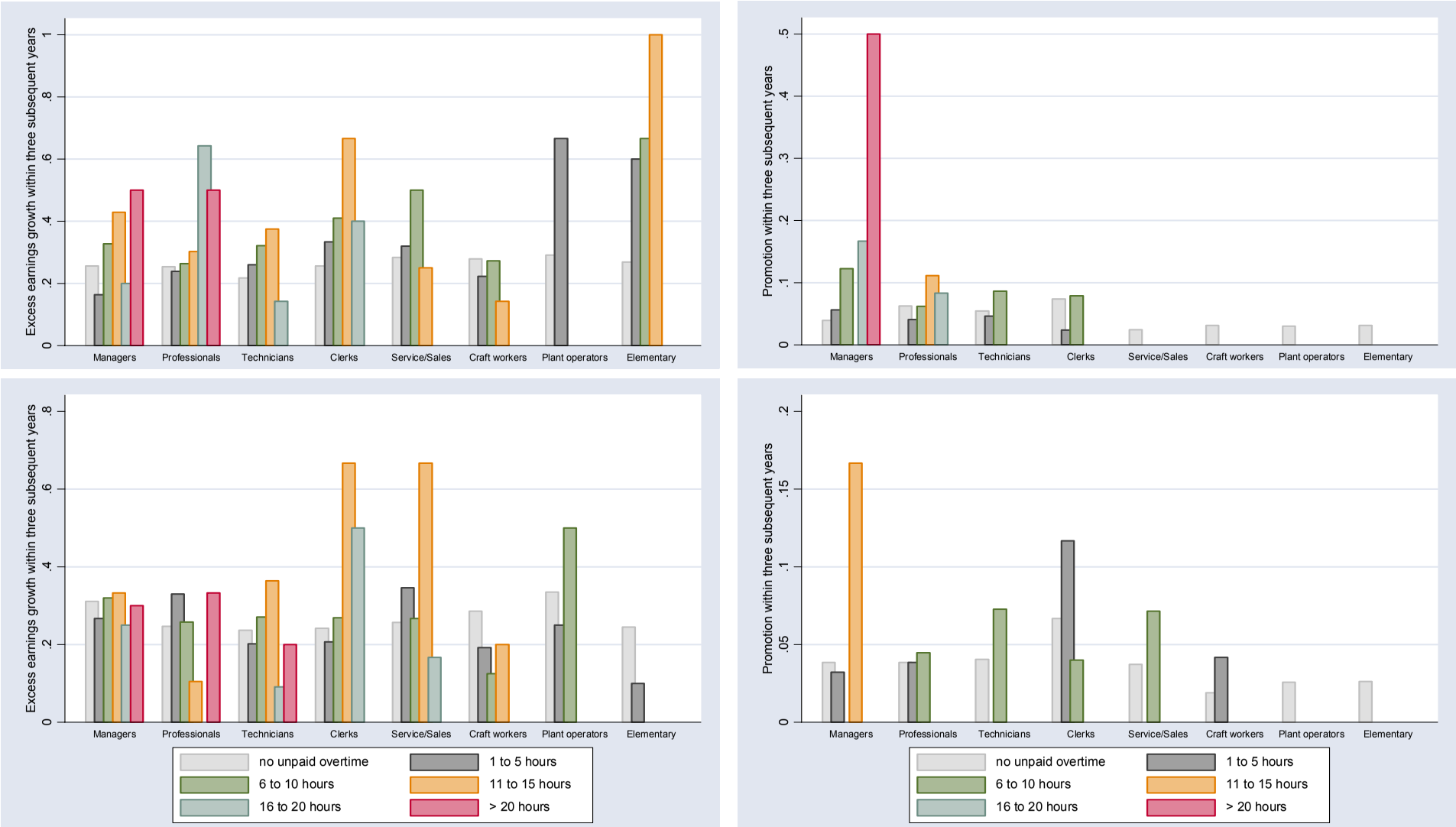
Figure 2: Average Unpaid Overtime Hours According to Tenure and Occupations



Source: SOEP, 1993-2004 (own calculations)
Sample: German male and female full-time employees, age 20-60, civil servants and self-employed persons excluded. The amount of weekly hours is averaged over all workers. Data are weighted using cross-sectional sample weights.

Figure 3: Incidence of Excess Earnings Growth and Promotion According to Occupations and Unpaid Overtime

(top: West Germany, bottom: East Germany)

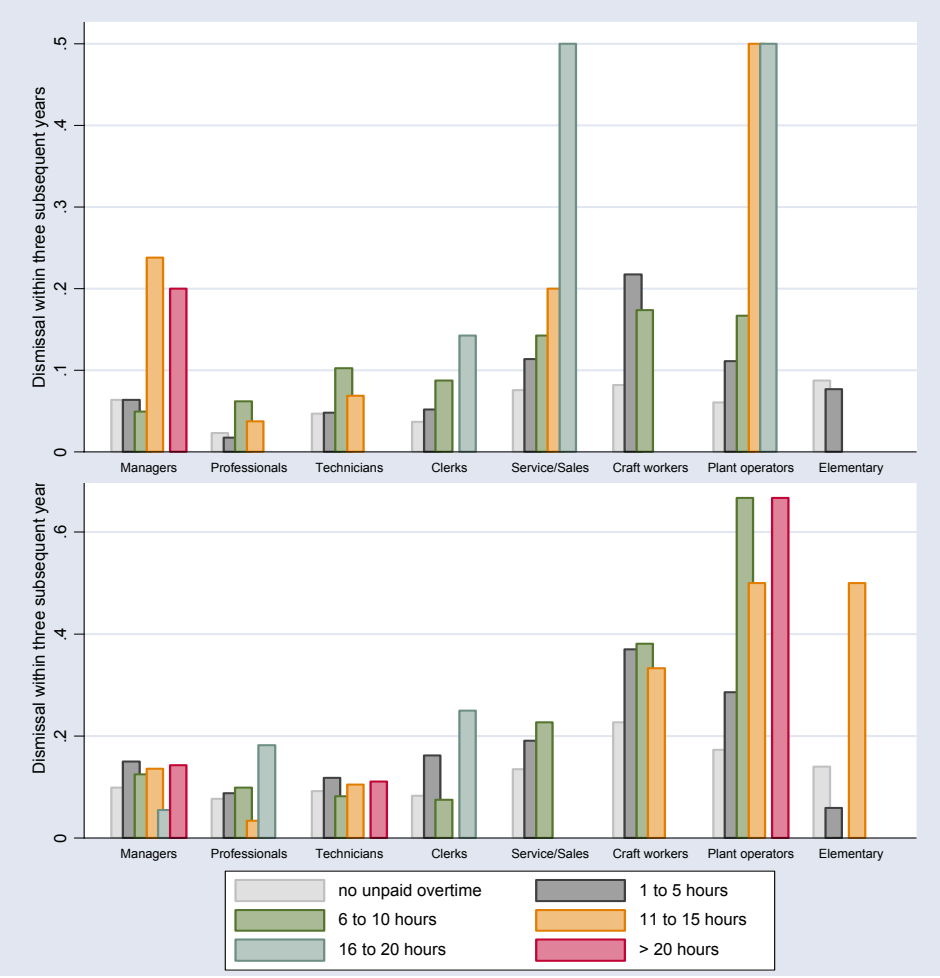


Source: SOEP, 1993-2004 (own calculations)

Sample: German male and female full-time employees, age 20-60, civil servants and self-employed persons excluded. Data are weighted using cross-sectional sample weights.

In East Germany, the link between unpaid overtime and wage growth does not seem to be as strong as in West Germany. However, in the group of clerks and service and sales workers, the fraction of excess wage growth workers is three times higher for workers with 11 to 15 hours of overtime than for workers without unpaid extra hours. The incidence of promotion also seems to be related to the amount of unpaid overtime hours. Whereas West German managers with more than 20 unpaid extra hours per week have the highest fraction of promoted workers, the percentage is highest for managers working 11 to 15 unpaid hours in East Germany. The incidence of dismissal for different occupations and unpaid overtime levels is displayed in Figure 4. which reveals that for some occupations, workers with more unpaid overtime hours have a higher percentage of layoffs in the three subsequent years. This may indicate that the supply of unpaid overtime does not prevent a future job loss. However, this requires further analysis which will follow hereafter.

Figure 4: Incidence of Dismissal According to Occupations and Unpaid Overtime
(top: West Germany, bottom: East Germany)



Source: SOEP, 1993-2004 (own calculations)
Sample: German male and female full-time employees, age 20-60, civil servants and self-employed persons excluded. Data are weighted using cross-sectional sample weights.

5. Econometric Analysis

5.1. Binary Choice Model

We estimate the effect of unpaid overtime hours on the probability of obtaining a future payoff by using a model of the following structure (see also Greene, 2000):

$$y^*_{i,t+z} = \alpha_i + \beta' x_{it} + \gamma' ov_{it} + \varepsilon_{it}, \quad (1)$$

where $y^*_{i,t+z}$ is the latent propensity of the individual *i* to get a payoff in the future period *t+z*, with *z*=1,2,3. Whereas *t+1* refers to the subsequent year, *t+2* and *t+3* refer to the future periods *within* the two and three subsequent years. x_{it} is a vector of individual and employer characteristics, and ov_{it} the weekly unpaid overtime hours worked by the individual at time *t*. α_i is the individual specific effect, β and γ are parameters to be estimated, and ε_{it} denotes the error term which is distributed with mean 0 and variance σ^2_ε. Therefore, whereas the dependent variable is measured at time *t+z*, all independent variables are measured at time *t*. As $y^*_{i,t+z}$ is a latent variable, it is not observable. What one observes is

$$y_{i,t+z} = \begin{cases} 1 & if\ y^*_{i,t+z} > 0 \\ 0 & otherwise \end{cases} \quad (2)$$

Assuming an underlying logistic distribution for ε_{it}, we get the following probability model:

$$\Pr ob(y_{i,t+z} = 1) = \frac{\exp(\alpha_i + \beta' x_{it} + \gamma' ov_{it})}{1 + \exp(\alpha_i + \beta' x_{it} + \gamma' ov_{it})}$$

In the first version of the logit model, the future payoff will take the form of excess earnings growth in the future, whereas in the second version, we will estimate the probability of a future promotion. In a third version, we use future layoff as the dependent variable.[10]

Conditional on unobserved individual specific heterogeneity, the outcomes are assumed to be independent. By using the panel structure of the data one can control for unobserved individual heterogeneity that might bias results from cross-sectional analyses. Here, the model will be estimated with two different specifications. The first is a pooled logit model which takes the individual specific effect a_i to be identical for all persons, therefore being a constant term. Second, a random effects logit model will be used, where α_i is allowed to differ across individuals but is assumed to be constant over time. It hence accounts for intrinsic differences in

[10] The Logit model is used for convenience, as the exponentiated form of the coefficient can be interpreted as the odds ratio.

tastes to unpaid overtime work and in other unobserved explanatory variables. The individual specific effect α_i is assumed to be randomly distributed across individuals and not to be correlated with the vector of covariates. If the individual effect α_i is correlated with the explanatory variables, a fixed effects approach would be required. However, averaging out the individual effects is not possible in limited dependent variable models due to their nonlinear nature. Therefore, we use the conditional maximum likelihood estimator by Chamberlain (1980) with the likelihood function being conditional upon a set of statistics t_i which are sufficient for α_i. In this estimator, the behavior of individuals without any change in the outcome variable would be completely captured by their individual effect α_i. Therefore, only workers with at least one change in the payoff variable are relevant for the estimation, which leads to a considerable restriction of the dataset. Hence, due to the limited number of workers who experience a dismissal or a promotion at least once in the observation period, the fixed effects logit model is only applied with excess earnings growth as a dependent variable. With excess earnings growth as binary outcome variable, the Hausman test will be used to test for the presence of individual specific effects. In the absence of individual specific effects, both the Chamberlain estimator and the standard logit maximum likelihood estimator are consistent, whereas the former is inefficient. However, in the presence of individual specific effects, only the fixed effects estimator is consistent.

5.2. Sample Selection Model

The estimation of the probability of excess earnings growth and promotion involves a potential bias arising from non-random sample selection. Career advancement in form of promotion and wage growth can only be observed for workers who stay in their firms for the considered future periods. However, it might well be the case that workers with a lower probability of promotion or pay rise are more likely to leave the firm due to dismissals or because they find a better job match in another firm. Therefore, persons are not randomly assigned to the future sample of workers for which promotions and changes in earnings can be observed. As a consequence, the error term might be correlated with the other explanatory variables and the estimates of the logit model might be biased. To correct for this selectivity bias, the probability of career advancement will be estimated in two steps. The first step is a reduced form selection model to estimate the probability of staying in the firm for the relevant future period. The explanatory variables are chosen to represent either the firm's choice to layoff a worker, or the worker's choice to leave the firm. In addition to variables used in the second step logit model, dummies for dependent children of different age categories and regional unemployment rates are included as covariates. Exemplary Probit estimates of the probability of staying in the same firm for West German workers are shown in Table A2 in the Appendix. In the second step, the predicted values of the inverse Mills ratios are used to estimate an augmented form of equation (1) with the probability

of a future promotion and excess wage growth as alternative outcome variables. This correction for sample selection controls for both, self-selection into and out of the firm, and yields consistent parameter estimates of equation (1). Since reported standard errors are inappropriate due to the estimated values of the Mills ratios in the first stage, standard errors will be corrected (Heckman, 1979).

6. Results

The logit estimates yield coefficients that are difficult to interpret, as they give the size of the change in the log of the odds, which results from a one unit change in the independent variable. However, their exponentiated form can be interpreted as the odds ratio, which is the probability of the event taking place divided by the probability of the event not taking place. Odds ratios greater than one derive from positive estimation coefficients, whereas odds ratios smaller than one arise from negative effects of a change in the independent variable on the probability of the outcome.[11] The following tables report only the odds ratios of the logit estimates, and do not additionally display the logit coefficients. To ensure consistency even in the presence of heteroskedasticity for individuals over time, robust standard errors are computed. The *z* statistics, which are reported in parentheses, correspond to the null hypothesis of no effect. The following tables show only the results for the working hours variables without reporting odds ratios of all independent variables, although all of the models are full-specified. The pooled logit estimates of all covariates for the probability of excess earnings growth, promotion, and layoff in the next year for West German workers can be seen in Table A3 in the Appendix. The likelihood of an excess earnings growth is positively associated with the number of desired working hours for all West Germans. Current monthly earnings including extra payments are highly significant but have almost no impact. For male workers, holding a temporary job and working in the wood and paper or banking and insurance industry is positively related to the probability of excess earnings growth, whereas working in the public sector affects the likelihood negatively. Furthermore, females who work in the chemical industry and in service and sales, have a lower probability of an excess earnings growth. The promotion probability for both males and females in West Germany is positively affected by a recent job change and by being employed in firms with more than five employees. Tenure has a positive but decreasing effect on the likelihood of promotion. In addition, male workers are more likely to be promoted with increasing desired working hours and years of education. The selectivity variable is positive and highly significant for male workers, whereas it is statistically significant only at the 10% level for female workers. The large effects of the inverse Mill's ratios for both men and women indicate that estimating the promotion probability without the correction for sample selection may yield inconsistent estimates of the true odds ratios for the likelihood of promotion. The promotion probability is lowest for women in elementary occupations, highest in the hotel and restaurant sector, and significantly higher for skilled than for unskilled blue-collar and white-collar female workers. The probability of layoff is positively affected by a recent job change for both men and women, whereas working in the public sector clearly decreases the likelihood of dismissal. Male workers have a lower probability of being laid off with increasing tenure and a higher layoff probability

[11] Since the odds ratio equals e^{β}, the absence of an effect ($\beta=0$) implies an odds ratio of 1 ($e^{\beta} = e^{0} = 1$).

is found for skilled blue-collar workers with respect unskilled blue-collar workers, which are used as the reference group.

6.1. Excess Earnings Growth

The estimates of the probability of an excess growth in gross monthly earnings including extra payments are shown in Table 3 for East and West German men and women. In addition to the amount of unpaid overtime hours, other compensation forms of overtime, contractual hours and further control variables are included in all of the estimates. In the pooled logit model, the odds ratio of unpaid overtime are greater than one in all estimates. However, the estimates of unpaid overtime are only significant for West German workers but not statistically significant for East German males and females. Whereas an increase in unpaid overtime by one hour raises the odds ratio of experiencing an excess earnings growth in the next year by about 4% for West German males, the increase is 8% for females. For both West German sub-samples, the positive and highly significant effect on the excess growth probability holds after controlling for unobserved worker heterogeneity in the random effects model. Furthermore, for female workers, the effect of unpaid overtime is only significant in the estimates of the probability of an excess earnings growth in the next, or within the two subsequent years, whereas for male workers, unpaid overtime hours are also associated in a significantly positive way with the likelihood of experiencing an excess wage growth within the three subsequent years. However, when applying the fixed effects logit model and therefore allowing for correlation between the individual specific effect and the covariates, all estimates of the unpaid overtime coefficient become insignificant. The only persistent significant positive effect arises from partially leisure compensated/partially paid overtime hours in the estimation for West German females. The impact of mixed compensated overtime hours on the likelihood of excess earnings growth was of a similar size as the unpaid overtime effect in the previous model specifications. According to the random effects logit model, an hourly increase in partially leisure compensated/partially paid overtime raises the odds ratio of experiencing an excess growth in earnings the next year by about 14%. For West German males, paid and leisure compensated overtime hours have a negative impact on the likelihood of experiencing an excess earnings growth in the fixed effects logit model. In the East German sample of male workers, there are no significant results of the working hours coefficients, while for women, both paid and partially leisure compensated/partially paid overtime is significantly associated with the probability of an excess wage growth in a positive way after controlling for unobserved heterogeneity in the random effects model. Using the likelihood ratio test to check the pooled against the random effects model supports the random effects logit model in all models. However, according to the Hausman test, the fixed effects model is the preferred specification.

Table 3: Overtime and Excess Earnings Growth Probability: Logit Estimate Odds Ratios

	Pooled Logit			Random Effects Logit			Fixed Effects Logit		
	t+1	t+2	t+3	t+1	t+2	t+3	t+1	t+2	t+3
West German Men									
Unpaid	1.041	1.063	1.065	1.039	1.062	1.074	0.984	1.001	1.009
	(2.63)**	(4.27)**	(4.02)**	(2.36)*	(3.25)**	(3.15)**	(0.51)	(0.03)	(0.20)
Paid	0.990	0.992	1.001	0.985	0.971	0.985	0.939	0.937	0.997
	(0.60)	(0.52)	(0.04)	(0.82)	(1.49)	(0.71)	(2.36)*	(2.27)*	(0.11)
Leisure	0.963	1.008	1.012	0.958	1.000	1.007	0.917	0.962	1.009
	(1.40)	(0.37)	(0.57)	(1.72)	(0.01)	(0.29)	(2.67)**	(1.24)	(0.26)
Leisure/paid	1.045	1.060	1.067	1.041	1.046	1.060	0.964	0.983	1.037
	(2.70)**	(3.84)**	(4.21)**	(2.41)*	(2.48)*	(2.77)**	(1.56)	(0.69)	(1.22)
Log-Likelihood	-2545.9	-2828.3	-2714.9	-2542.3	-2767.4	-2588.2	-949.6	-902.3	-707.1
Observations	7,802	6,560	5,542	7,802	6,635	5,644	3,659	3,584	3,140
East German Men									
Unpaid	1.019	1.019	1.026	1.021	1.024	1.040	0.956	0.935	0.958
	(0.90)	(1.04)	(1.39)	(0.99)	(1.11)	(1.35)	(1.13)	(1.57)	(0.82)
Paid	1.002	1.001	1.023	1.000	0.988	1.018	0.930	0.947	1.039
	(0.09)	(0.05)	(1.14)	(0.02)	(0.50)	(0.65)	(1.85)	(1.45)	(0.91)
Leisure	0.951	0.989	1.012	0.949	0.992	1.036	0.950	0.946	0.985
	(1.63)	(0.40)	(0.47)	(1.51)	(0.26)	(0.99)	(1.11)	(1.30)	(0.32)
Leisure/paid	1.028	1.027	1.040	1.027	1.022	1.022	1.012	0.981	0.978
	(1.31)	(1.29)	(1.80)	(1.17)	(0.88)	(0.68)	(0.35)	(0.48)	(0.46)
Log-Likelihood	-1386.9	-1503.0	-1415.0	-1386.1	-1482.7	-1334.0	-469.7	-463.6	-338.4
Observations	4,206	3,449	2,881	4,206	3,489	2,943	2,043	1,960	1,679
West German Women									
Unpaid	1.084	1.075	1.035	1.084	1.101	1.055	0.993	1.024	1.070
	(2.59)**	(2.06)*	(0.92)	(2.26)*	(2.19)*	(1.04)	(0.10)	(0.36)	(0.84)
Paid	1.060	1.007	0.922	1.060	1.015	0.929	1.120	1.099	0.929
	(0.79)	(0.09)	(0.78)	(0.80)	(0.18)	(0.77)	(1.04)	(0.81)	(0.60)
Leisure	1.052	1.044	1.017	1.052	1.057	1.030	1.022	0.995	1.037
	(1.69)	(1.57)	(0.54)	(1.62)	(1.53)	(0.68)	(0.35)	(0.08)	(0.45)
Leisure/paid	1.102	1.122	1.109	1.102	1.139	1.126	1.142	1.144	1.088
	(2.78)**	(3.21)**	(2.40)*	(2.97)**	(3.15)**	(2.24)*	(2.20)*	(1.73)	(0.96)
Log-Likelihood	-897.0	-995.7	-918.4	-896.6	-981.9	-890.3	-230.8	-241.7	-197.1
Observations	3,466	2,745	2,192	3,467	2,773	2,230	1,273	1,227	1,012
East German Women									
Unpaid	1.012	1.024	1.038	1.013	1.045	1.077	1.046	1.077	1.115
	(0.31)	(0.58)	(1.01)	(0.36)	(1.07)	(1.72)	(0.72)	(1.21)	(1.57)
Paid	1.110	1.047	1.041	1.114	1.052	1.044	0.947	0.889	1.283
	(2.37)*	(0.96)	(0.83)	(2.30)*	(0.83)	(0.51)	(0.55)	(1.01)	(1.70)
Leisure	1.031	1.027	1.022	1.031	1.026	1.011	1.012	0.980	0.988
	(0.88)	(0.77)	(0.60)	(0.86)	(0.58)	(0.19)	(0.20)	(0.29)	(0.13)
Leisure/paid	1.086	1.029	1.052	1.092	1.030	1.065	1.037	0.991	1.047
	(2.67)**	(0.90)	(1.64)	(2.62)**	(0.72)	(1.27)	(0.59)	(0.14)	(0.65)
Log-Likelihood	-830.6	-880.8	-839.9	-830.0	-859.9	-794.1	-231.3	-216.1	-163.9
Observations	2,981	2,450	2,062	2,989	2,475	2,098	1,227	1,159	976

Source: SOEP, 1993-2004.
Sample: German full-time employees, aged 20-65, civil servants and self-employed persons excluded
Note: The regression model is full-specified, independent variables include individual and job characteristics as well as region and year dummies. *significant at the 5% level, **significant at the 1% level

6.2. Promotion Probability

Table 4 presents the estimates of the probability of promotion with the odds ratios of unpaid hours and other compensation forms of overtime. In the pooled logit model, the odds ratios of unpaid overtime are smaller than one in the estimates for West German men and in some of the estimates for female workers. However, there is no significant coefficient on unpaid overtime in the pooled logit specification. Most of the other compensation forms are equally insignificant with the exception of paid overtime and partially leisure compensated/partially paid overtime in the estimates for West German males. Whereas an increase in paid overtime by one hour is associated with a 8.5% decrease in the odds ratio of being promoted within the three subsequent years, an hourly increase in the mixed compensated overtime implies a 10% higher odds ratio of experiencing a promotion within the next, the two subsequent, or the three subsequent years.

When controlling for unobserved heterogeneity by using a random effects logit specification, the effect of unpaid overtime becomes statistically significant at the 5% level for East German male workers. For this worker group, an increase in unpaid overtime by one hour per week adds 26% to the odds ratio of experiencing a promotion within the two subsequent years. For the same time horizon, an hourly increase in unpaid overtime is associated with a 12% rise in the odds ratio for West German women but this effect is only significant at the 10% level. For all other workers, there is no association between unpaid overtime and the likelihood of promotion prospects. While for West German male workers, partially leisure compensated/partially paid overtime hours have a positive impact on the promotion probability, purely leisure compensated overtime hours raise the promotion prospects of West German females. However, the coefficient of leisure compensated overtime is negative and statistically significant in the random effects estimation for East German women, when unobserved heterogeneity is controlled for. Hence, with exception of East German male workers, there is very limited evidence for a positive relationship between unpaid overtime hours and promotion probability. Depending on the worker group, other compensation forms of overtime seem to be equally important, which is especially true for partially leisure compensated/partially paid and purely leisure compensated overtime.

Table 4: Overtime and Promotion Probability: Logit Estimate Odds Ratios

	Pooled Logit			Random Effects Logit		
	t+1	t+2	t+3	t+1	t+2	t+3
West German Men						
Unpaid	0.998	0.990	0.986	0.987	0.960	0.916
	(0.04)	(0.28)	(0.46)	(0.27)	(0.65)	(1.43)
Paid	0.948	0.911	0.915	0.949	0.908	0.933
	(0.77)	(1.84)	(2.04)*	(0.77)	(1.25)	(0.80)
Leisure	1.044	1.045	1.039	1.035	1.047	1.026
	(1.10)	(1.15)	(1.12)	(0.73)	(0.79)	(0.36)
Leisure/paid	1.092	1.106	1.080	1.090	1.110	1.079
	(2.98)**	(3.97)**	(2.96)**	(2.53)*	(2.40)*	(1.59)
Log-Likelihood	-508.5	-675.6	-742.7	-502.4	-588.7	-552.0
Observations	8,350	7,021	5,856	8,527	7,167	5,949
East German Men						
Unpaid	1.034	1.045	1.016	1.034	1.256	0.929
	(0.66)	(1.27)	(0.46)	(0.58)	(2.02)*	(0.54)
Paid	1.043	1.057	1.075	1.043	1.080	0.984
	(0.55)	(1.12)	(1.69)	(0.68)	(0.73)	(0.14)
Leisure	1.032	1.079	1.082	1.032	0.998	1.185
	(0.43)	(1.37)	(1.62)	(0.36)	(0.01)	(0.96)
Leisure/paid	0.901	0.985	0.997	0.901	0.758	0.955
	(0.95)	(0.21)	(0.04)	(0.78)	(1.42)	(0.15)
Log-Likelihood	-172.3	-247.7	-233.0	-172.4	-207.1	-175.4
Observations	4,105	3,356	2,585	4,449	3,627	2,993
West German Women						
Unpaid	0.900	1.003	0.975	0.900	1.117	1.046
	(1.64)	(0.06)	(0.57)	(1.27)	(1.61)	(0.46)
Paid	0.898	0.771	1.125	0.898	0.695	1.443
	(0.43)	(0.88)	(1.12)	(0.29)	(0.36)	(1.48)
Leisure	1.070	1.062	1.082	1.070	1.256	1.420
	(1.28)	(1.04)	(1.48)	(1.13)	(2.22)*	(2.51)*
Leisure/paid	0.990	0.971	0.898	0.990	0.838	0.786
	(0.16)	(0.45)	(1.27)	(0.13)	(0.94)	(1.15)
Log-Likelihood	-212.7	-266.4	-271.0	-213.7	-240.3	-215.4
Observations	3,260	2,695	2,073	3,786	3,027	2,361
East German Women						
Unpaid	1.006	0.988	1.034	1.006	0.914	0.854
	(0.08)	(0.13)	(0.28)	(0.05)	(0.34)	(0.49)
Paid	1.149	1.086	1.144	1.149	1.237	1.831
	(1.50)	(0.94)	(1.68)	(0.99)	(0.64)	(1.48)
Leisure	0.812	0.933	1.031	0.811	0.716	1.082
	(1.53)	(0.73)	(0.35)	(1.26)	(2.04)*	(0.58)
Leisure/paid	1.071	1.076	0.975	1.071	0.797	0.860
	(1.08)	(0.93)	(0.30)	(0.85)	(1.38)	(0.91)
Log-Likelihood	-144.5	-201.2	-202.7	-144.2	-167.1	-151.7
Observations	2,480	2,045	1,605	3,296	2,688	2,191

Source: SOEP, 1993-2004.
Sample: German full-time employees, aged 20-65, civil servants and self-employed persons excluded
Note: The regression model is full-specified, independent variables include individual and job characteristics as well as region and year dummies. *significant at the 5% level, **significant at the 1% level

6.3. Layoff Probability

The pooled and random effects estimates of the likelihood of being laid off in the next year, within the next two years, and within the next three years, are shown in Table 5. Except for the estimates for female workers in East Germany, the odds ratios of unpaid overtime hours are greater than one in the pooled logit model which indicates a positive relationship between unpaid hours and the probability of dismissal in these estimates. Yet, the positive coefficients on unpaid hours are not highly statistically significant. The greatest significance occurs in the estimates for West German females, where an hourly increase in unpaid overtime implies a 6% higher odds ratio of being laid off within the three subsequent years at the 10% level. However, the odds ratios in the estimates for East German women are less than zero and significant at the 5% and 1% level. For East German females, an increase in unpaid overtime by one weekly hour is associated with a 10% lower odds ratio of experiencing a dismissal next year, within the two subsequent, or the three subsequent years. The negative relationship between working hours and the future layoff probability holds also for paid overtime in the case of East German males and for partially leisure compensated/partially paid overtime for West German females.

In the random effects estimates, the negative relationship between unpaid overtime and the probability of dismissal persists for East German females at the 10% significance level, and becomes even more significant, when the subsequent two periods are considered. Increasing the workweek by one unpaid hour is associated with a 25% lower odds ratio of dismissal within the next two years for East German women. However, when controlling for unobserved heterogeneity in the random effects specification, the odds ratio of unpaid overtime becomes significantly greater than one in the estimation for West German men. For West German male workers, an increase in unpaid overtime by one hour implies a 9% higher odds ratio of being dismissed within the next two or three years. A somewhat weaker, but also positive effect can be observed for East German male workers. At the same time, partially leisure compensated/partially paid overtime hours as well as purely leisure compensated overtime hours significantly reduce the risk of job loss in the next year for the worker group of West German males. To summarize, for male workers, unpaid extra hours do not seem to prevent but rather to entail a future layoff, whereas other compensation forms of overtime have more favorable consequences for male workers who supply additional hours. However, the future payoff in form of job retention does seem to be related to unpaid overtime hours worked by females in East Germany.

Table 5: Overtime and Layoff Probability: Logit Estimate Odds Ratios

	Pooled Logit			Random Effects Logit		
	t+1	t+2	t+3	t+1	t+2	t+3
West German Men						
Unpaid	1.022	1.029	1.030	1.030	1.089	1.086
	(0.82)	(1.37)	(1.53)	(1.05)	(2.55)*	(2.12)*
Paid	0.940	0.956	0.972	0.943	0.977	1.034
	(1.65)	(1.76)	(1.34)	(1.53)	(0.65)	(0.90)
Leisure	0.911	1.004	0.986	0.906	1.030	0.987
	(1.88)	(0.11)	(0.36)	(1.68)	(0.66)	(0.25)
Leisure/paid	0.890	0.949	0.964	0.889	0.953	0.948
	(1.84)	(1.32)	(1.20)	(2.03)*	(1.01)	(0.94)
Log-Likelihood	-837.9	-1238.9	-1458.9	-836.4	-1133.5	-1188.8
Observations	10,887	9,569	8,427	10,887	9,583	8,469
East German Men						
Unpaid	1.027	1.004	1.009	1.026	1.007	1.058
	(1.23)	(0.20)	(0.54)	(1.17)	(0.25)	(1.88)
Paid	0.963	0.961	0.961	0.963	0.971	0.979
	(1.46)	(1.86)	(2.22)*	(1.34)	(1.06)	(0.71)
Leisure	0.989	1.023	1.020	0.988	1.057	1.123
	(0.30)	(0.87)	(0.84)	(0.33)	(1.52)	(2.94)**
Leisure/paid	1.017	1.003	1.007	1.018	1.015	1.042
	(0.64)	(0.11)	(0.35)	(0.65)	(0.48)	(1.23)
Log-Likelihood	-1145.7	-1603.3	-1814.6	-1145.0	-1509.7	-1547.0
Observations	6,001	5,343	4,744	6,028	5,385	4,823
West German Women						
Unpaid	1.056	1.057	1.068	1.055	1.017	1.196
	(1.62)	(1.80)	(1.93)	(1.25)	(0.17)	(1.71)
Paid	0.926	1.061	1.022	0.928	1.117	1.166
	(0.63)	(0.78)	(0.30)	(0.53)	(0.58)	(0.77)
Leisure	0.900	1.018	0.997	0.900	1.033	0.888
	(1.31)	(0.38)	(0.08)	(1.27)	(0.46)	(1.37)
Leisure/paid	0.900	0.883	0.886	0.899	0.830	0.863
	(1.46)	(1.94)	(2.03)*	(1.10)	(1.67)	(1.14)
Log-Likelihood	-383.6	-545.4	-594.8	-382.9	-496.6	-458.7
Observations	5,081	4,446	3,878	5,148	4,491	3,936
East German Women						
Unpaid	0.909	0.900	0.940	0.908	0.746	0.921
	(2.03)*	(3.09)**	(2.15)*	(1.79)	(3.73)**	(1.30)
Paid	1.093	1.063	1.038	1.094	1.275	1.188
	(1.57)	(1.41)	(0.91)	(1.78)	(1.71)	(1.54)
Leisure	1.024	0.945	0.974	1.024	0.871	1.169
	(0.52)	(1.29)	(0.74)	(0.47)	(1.94)	(1.66)
Leisure/paid	1.000	0.981	0.971	1.001	1.023	1.074
	(0.01)	(0.48)	(0.88)	(0.02)	(0.29)	(0.89)
Log-Likelihood	-570.7	-813.0	-910.9	-570.2	-718.2	-693.4
Observations	4,462	3,961	3,502	4,462	3,968	3,528

Source: SOEP, 1993-2004.
Sample: German full-time employees, aged 20-65, civil servants and self-employed persons excluded
Note: The regression model is full-specified, independent variables include individual and job characteristics as well as region and year dummies. *significant at the 5% level, **significant at the 1% level

6.4. Robustness Checks and Extensions

As an extension to the model, we investigate interactions between unpaid overtime hours and some of the covariates, since it might well be the case that the effect of unpaid overtime on the probability of obtaining a future payoff depends on particular worker, job, or firm characteristics. Therefore, we interact unpaid overtime hours with education, occupation groups, firm size, and industry, and estimate the probability of an excess earnings growth, promotion, and layoff in the next, two subsequent, and three subsequent years. However, since the interaction terms did not show to be significant, they will not be reported here.

6.4.1. Variations in the Sample

In order to check the robustness of the results, the analysis is modified in several ways. First, the sample is restricted to white-collar workers, among whom unpaid overtime is more prevalent. White-collar workers are to a lesser extent covered by overtime provisions which result from collective bargaining. Furthermore, the different characteristics of white-collar jobs, such as the related uncertainty over job task completion times or leadership roles, involve more unpaid overtime than it is the case for blue-collar jobs. Moreover, the output of blue-collar workers is usually easier to measure, which restricts the need for the approximation of performance with working hours, and for incentive provision contracts, such as deferred compensation or tournaments. Table 6. shows random effects logit estimates of the probability of an excess earnings growth, promotion, and layoff for East and West German male white-collar workers.[12] The odds ratio of the likelihood of excess earnings is again greater than one and significant only for West German males workers. However, this effect would eventually vanish, when using a fixed effects logit model, which does not rely on the orthogonality assumption. The coefficients on unpaid overtime in the estimation of the promotion probability are not significant at all, although in the previous estimates for all workers, a significant positive effect was found for East German workers. The impact of a positive relationship between unpaid overtime and the probability of job loss for West German males is robust, when only white-collar workers are considered. The increase in the workweek by one unpaid extra hour is associated with a 13% higher odds ratio of being laid off in the two subsequent years for white-collar workers.

[12] The fixed effects Logit model will not be used for the smaller sub-sample of white-collar workers, since the restriction to workers with at least one payoff in the observation period does not leave enough observations.

Table 6: Overtime and Future Payoffs for White-Collar Workers: RE Logit Estimate Odds Ratios

	West Germany			East Germany		
Male workers	t+1	t+2	t+3	t+1	t+2	t+3
Excess Earnings Growth						
Unpaid	1.027	1.040	1.060	1.006	1.003	1.004
	(1.52)	(1.82)	(2.11)*	(0.27)	(0.13)	(0.13)
Paid	0.993	0.948	0.950	0.951	0.910	1.006
	(0.25)	(1.53)	(1.26)	(0.79)	(1.35)	(0.09)
Leisure	0.970	1.009	0.997	0.987	1.011	1.018
	(1.03)	(0.29)	(0.09)	(0.30)	(0.26)	(0.34)
Leisure/paid	1.055	1.059	1.066	1.019	1.005	0.938
	(2.74)**	(2.54)*	(2.30)*	(0.49)	(0.11)	(0.96)
Observations	4,333	3,681	3,117	1,532	1,250	1,037
Promotion						
Unpaid	0.999	1.015	0.943	0.990	0.998	1.222
	(0.01)	(0.25)	(0.70)	(0.12)	(0.68)	(0.09)
Paid	1.025	1.022	0.991	1.158	1.562	3.639
	(0.33)	(0.21)	(0.07)	(1.13)	(0.53)	(0.14)
Leisure	1.096	1.171	1.019	0.931	2.241	4.430
	(1.73)	(2.14)*	(0.19)	(0.54)	(0.13)	(0.09)
Leisure/paid	1.107	1.163	1.113	0.797	2.449	1.357
	(2.32)*	(2.73)**	(1.59)	(0.98)	(0.46)	(0.04)
Observations	4,793	4,049	3,341	1,652	1,339	1,096
Layoff						
Unpaid	1.019	1.127	1.088	1.034	1.048	0.995
	(0.54)	(2.25)*	(1.37)	(1.06)	(0.96)	(0.10)
Paid	0.871	0.795	0.904	1.011	1.100	1.261
	(1.39)	(1.65)	(0.85)	(0.13)	(0.97)	(1.98)*
Leisure	0.845	1.103	1.109	0.918	0.942	0.911
	(1.84)	(1.11)	(1.14)	(0.86)	(0.56)	(0.92)
Leisure/paid	0.811	0.936	0.929	1.011	1.078	0.950
	(2.07)*	(0.74)	(0.81)	(0.17)	(0.69)	(0.40)
Observations	5,943	5,186	4,545	2,149	1,905	1,685

Source: SOEP, 1993-2004.
Sample: German full-time employees, aged 20-65, civil servants and self-employed persons excluded
Note The regression model is full-specified, independent variables include individual and job characteristics as well as region and year dummies. *significant at the 5% level, **significant at the 1% level

Another modification in the sample is to exclude workers in the public sector as a further check of robustness. This might be important with respect to earnings growth and promotions, since career advancement in the public sector usually takes place on the grounds of seniority instead of on merit.[13] Moreover, the exclusion of the public sector as robustness check might be important, when investigating the probability of layoff, since in public firms, the risk of layoff is by far lower than in the private sector. As can be seen in Table 7., the results are very similar to the results of the estimates, where the public service is included. The positive effects of unpaid overtime on excess earnings growth is significant for West German males, but not for East

[13] The way how people achieve career advancement might, of course, also differ between companies, depending on their institutional background. Whereas some firms might rely on seniority, in other companies, such as U.S. firms, promotions and pay rises are more heavily based on merit.

German workers, and there is no significant impact of unpaid hours on the probability of promotion. Again, the positive coefficients of unpaid overtime in the estimates of the layoff probability are significant, and slightly higher than in the previous estimates without excluding the public sector.

Table 7: Overtime and Future Payoffs in the Private Sector: RE Logit Estimate Odds Ratios

	West Germany			East Germany		
Male workers	t+1	t+2	t+3	t+1	t+2	t+3
Excess Earnings Growth						
Unpaid	1.038	1.055	1.066	1.015	1.025	1.026
	(2.20)*	(2.71)**	(2.62)**	(0.66)	(1.10)	(0.80)
Paid	0.984	0.970	0.986	1.000	0.981	1.012
	(0.88)	(1.50)	(0.63)	(0.02)	(0.77)	(0.40)
Leisure	0.959	0.998	1.001	0.956	0.968	1.021
	(1.58)	(0.07)	(0.04)	(1.18)	(0.89)	(0.49)
Leisure/paid	1.040	1.043	1.055	1.018	1.016	1.036
	(2.28)*	(2.17)*	(2.31)*	(0.71)	(0.59)	(0.95)
Observations	6,498	5,518	4,678	3,351	2,778	2,336
Promotion						
Unpaid	0.953	0.948	0.932	1.028	1.377	0.156
	(0.80)	(0.83)	(0.94)	(0.34)	(1.09)	(0.08)
Paid	0.964	0.888	0.935	1.078	0.987	0.954
	(0.51)	(1.40)	(0.65)	(0.97)	(7.44)**	(0.13)
Leisure	1.046	1.090	0.996	1.059	1.774	1.989
	(0.78)	(1.18)	(0.04)	(0.52)	(0.90)	(0.34)
Leisure/paid	1.119	1.117	1.124	0.801	0.999	0.910
	(2.95)**	(2.33)*	(1.67)	(0.99)	(5.79)**	(0.12)
Observations	7,054	5,911	4,888	3,505	2,835	2,333
Layoff						
Unpaid	1.032	1.093	1.106	1.031	1.019	1.081
	(1.09)	(2.54)*	(2.62)**	(1.34)	(0.69)	(2.28)*
Paid	0.941	0.975	1.030	0.965	0.966	0.966
	(1.55)	(0.70)	(0.83)	(1.26)	(1.20)	(1.15)
Leisure	0.895	1.035	1.017	0.994	1.077	1.126
	(1.78)	(0.74)	(0.34)	(0.15)	(1.86)	(2.81)**
Leisure/paid	0.880	0.954	0.944	1.023	1.021	1.038
	(2.12)*	(0.99)	(1.21)	(0.82)	(0.68)	(1.10)
Observations	9,125	8,024	7,079	4,823	4,312	3,859

Source: SOEP, 1993-2004.
Sample: German full-time employees, aged 20-65, civil servants and self-employed persons excluded
Note The regression model is full-specified, independent variables include individual and job characteristics as well as region and year dummies. *significant at the 5% level, **significant at the 1% level

Lastly, we restricted the sample to a younger worker group with workers of age 25 to 50. We conducted this check of robustness, since elder workers might not largely expect promotions and pay rises. However, these estimates did not yield any significant changes in the results. To summarize, the results in the main analysis above did not show to be sensitive to variations in the sample. Any positive relationship between unpaid overtime and future earnings growth is likely

to be driven by unobserved heterogeneity which is correlated with observed characteristics. Furthermore, there is only weak evidence for unpaid overtime to be positively associated with the likelihood of promotion. However, the negative relationship between unpaid extra hours and the probability of a future layoff was found to be robust to variations in the sample.

6.4.2. Variation in the Measure of Wage Growth

Another robustness test is to modify the outcome variable of wage growth. The measure of excess earnings growth, i.e. growth which is at least one standard deviation higher than the average earnings growth of workers in the same job scale in the respective year, is a rather strict test. Hence, it will be replaced by a variable for future earnings growth. The use of a continuous variable has, furthermore, the advantage that no valuable information is lost by generating dummy variables. Therefore, the growth in earnings including extra payments in the next year, within the two subsequent years, and within the three subsequent years is computed and regressed on the same independent variables as in the model above, using a linear fixed effects model. Table 8. shows the results of these estimates for East and West German workers, and reveals that not only unpaid hours, but also other compensation forms of overtime are related to short-run earnings growth in a significant negative way. The only worker group which seems to benefit from currently working extra hours in terms of higher wage growth are West German females. However, the negative effects associated with unpaid overtime hours are very small, indicating that an increase in weekly unpaid extra hours decreases future earnings growth by less than 1%. Therefore, the findings of no significant relationship between unpaid overtime and earnings growth within the three subsequent years can be confirmed by changing the wage growth measure.

6.4.3. Unpaid Overtime as Deviation from the Mean

Another modification of the analysis includes the use of a relative measure of overtime hours. This might be important to investigate the tournament character of overtime, as future outcomes might well depend on a limited number of available payoffs, and the realization of these payoffs may therefore depend on the performance of other workers in the same company. However, overtime hours of a respondent's co-workers are not identified in the SOEP. Therefore, we calculate the mean of overtime hours in the same occupation in every year for East and West Germany separately. This allows us to use a worker's deviation from the mean in the worker's industry as explanatory variable for estimates of the probability of excess wage growth, promotion, and layoff.

Table 8: Overtime and Future Wage Growth: Fixed Effects Coefficients

	West Germany			East Germany		
	t+1	t+2	t+3	t+1	t+2	t+3
Male Workers						
Unpaid	-0.002	-0.003	-0.007	-0.002	-0.000	-0.005
	(1.49)	(1.77)	(3.48)**	(1.09)	(0.04)	(2.25)*
Paid	-0.007	-0.010	-0.008	-0.001	-0.007	-0.002
	(6.30)**	(6.49)**	(4.47)**	(0.76)	(3.87)**	(0.91)
Leisure	-0.006	-0.003	-0.005	0.001	-0.002	-0.002
	(4.43)**	(1.62)	(2.49)*	(0.29)	(0.76)	(0.84)
Leisure/paid	-0.003	-0.007	-0.009	0.003	-0.003	-0.002
	(2.48)*	(4.23)**	(4.93)**	(1.73)	(1.81)	(0.99)
Observations	7,802	6,495	5,437	4,206	3,419	2,830
Female Workers						
Unpaid	0.003	0.008	-0.001	0.000	0.002	-0.000
	(1.56)	(3.03)**	(0.29)	(0.14)	(0.92)	(0.04)
Paid	-0.004	-0.002	-0.006	-0.004	-0.014	-0.011
	(1.19)	(0.40)	(1.09)	(1.48)	(4.44)**	(2.75)**
Leisure	0.003	0.003	0.002	-0.002	0.001	-0.000
	(1.56)	(1.19)	(0.75)	(1.28)	(0.27)	(0.05)
Leisure/paid	0.005	0.006	0.003	0.001	-0.001	0.001
	(2.69)**	(2.03)*	(0.90)	(0.68)	(0.55)	(0.24)
Observations	3,467	2,715	2,147	2,989	2,433	2,028

Source: SOEP, 1993-2004.
Sample: German full-time employees, aged 20-65, civil servants and self-employed persons excluded
Note: The regression model is full-specified, independent variables include individual and job characteristics as well as region and year dummies. *significant at the 5% level, **significant at the 1% level

Table 9 presents the odds ratios of the random effects logit estimates for male workers. Strikingly, the results are very similar to the results of the estimates which include the level of unpaid overtime as explanatory variable. For West German male workers, the positive effects of unpaid overtime, as deviation from the mean, on excess earnings growth is highly significant for all future time periods, whereas this effect is weaker and barely significant for East German males. In the estimation of the promotion probability, the deviation from the mean of unpaid overtime is significant for East German men. Again, the findings of a positive relationship between unpaid overtime and the probability of job loss for West German males is robust, when the deviations from the mean of unpaid extra hours are taken into account. The estimates show that now the effect is also positive for East German workers. As a result, the findings of the main analysis show to be robust to changes in the unpaid overtime measure.

Table 9: Deviation from Mean and Future Payoffs: RE Logit Estimate Odds Ratios (Men)

	West Germany			East Germany		
	t+1	t+2	t+3	t+1	t+2	t+3
Excess Earnings Growth						
Deviation Unpaid Overtime	1.036	1.059	1.0684	1.024	1.028	1.045
	(2.23)*	(3.20)**	(2.98)**	(1.12)	(1.28)	(1.57)
Observations	7,802	6,635	5,633	4,206	3,489	2,932
Promotion						
Deviation Unpaid Overtime	0.992	0.958	0.909	1.034	1.297	0.9137
	(0.17)	(0.69)	(1.34)	(0.59)	(2.36)*	(0.62)
Observations	10,887	9,583	8,469	6,028	5,385	4,823
Layoff						
Deviation Unpaid Overtime	1.030	1.085	1.083	1.027	1.012	1.060
	(1.05)	(2.53) *	(2.19) *	(1.23)	(0.44)	(1.96) *
Observations	8,527	7,167	5,949	4,449	3,627	2,993

Source: SOEP, 1993-2004.
Sample: German full-time employees, aged 20-65, civil servants and self-employed persons excluded
Note: The regression model is full-specified, independent variables include individual and job characteristics as well as region and year dummies. *significant at the 5% level, **significant at the 1% level

7. Conclusion

The objective of this study was to analyze future consequences of unpaid overtime. To investigate whether working hours can be interpreted as an investment, the relationship between unpaid overtime and career advancement was examined. Future payoffs of working hours are consistent with a number of theories and might be interpreted as returns to firm-specific human capital, gift exchange, deferred compensation, prizes in a tournament, or the payment for signaling productivity, motivation, or loyalty to the employer. Empirical evidence for future payoffs in form of higher wage growth, promotions, and job retention could provide an explanation for the supply of uncompensated extra hours. Using data from the SOEP for the years 1993 to 2004, we investigated for East and West German male and female full-time employees whether a higher number of unpaid extra hours involves a higher probability of promotion and excess earnings growth, and a lower probability of layoff in the subsequent years. Excess earnings growth was defined as growth, which is at least one standard deviation higher than the average earnings growth of workers in the same job scale in the respective year. In our pooled, random effects, and fixed effects logit estimates, we only find limited evidence for the investment character of unpaid overtime hours. The positive effects of unpaid hours on the likelihood of experiencing future excess growth in earnings which are found for West German workers, vanish as soon as unobserved heterogeneity is controlled for by applying panel estimators. Even when controlling for individual specific effects, unpaid overtime is positively associated with the probability of a future promotion for East German men and for West German women. However, other compensation forms of overtime, in particular partially leisure compensated/partially paid and purely leisure compensated overtime, seem to be equally important for the determination of the promotion probability. Furthermore, unpaid overtime hours do not necessarily have the expected negative impact on the likelihood of being laid off. On the contrary, the unpaid overtime coefficient is found to be significantly positive based on estimates for West German men, which indicates that unpaid hours do not help to prevent layoffs. Unpaid overtime hours were only found to be rewarded with job retention for the group of female workers in East Germany. These results were confirmed by the robustness checks and extensions to the model. We conclude that there is only partial empirical evidence for future payoffs of unpaid overtime work in the short run.

These results are in contrast to earlier findings on Germany (Pannenberg, 2005) and Great Britain (Francesconi, 2001; Booth et al., 2003), as we find no persistent positive correlation between current overtime hours and future payoffs, when unobserved heterogeneity is controlled for. However, Francesconi (2001) and Booth et al. (2003) both use random effects panel estimators to determine the probability of promotion, which do not allow for correlations between the individual specific effect and explanatory variables. Furthermore, they do not

distinguish between different compensation forms of overtime. Therefore, a further extension to the present model would be to investigate the relationship between total overtime hours and the promotion probability with a random effects estimator in order to compare the results to their findings for Great Britain. The contrast to the findings of long-term earnings effects of unpaid overtime for West Germany (Pannenberg, 2005) might be explained by the differing time horizons, as the present study focused on the future period within the three subsequent years. As another extension, one might hence consider unpaid overtime effects on excess wage growth, promotions, and layoffs for longer time periods. However, this clearly restricts the generalization of the results, as only workers who stay at their firm for a long time period can be analyzed, which might bias the result due to non-random sample selection. The relationship between unpaid overtime hours and the probability of layoff has not been analyzed to date, and requires further research. The objective of future research is to explain the positive association between unpaid extra hours and future dismissals, which arises for male workers mainly in West Germany. Potential explanations might be that unpaid overtime is taken as a signal for lower productivity, since extra hours might be used by unproductive workers to catch up with their more productive colleagues, and therefore to understate the working time actually taken in order to build a good reputation (Bell and Hart, 1999). Another explanation might be that workers provide unpaid overtime hours in firms which are at risk to close down. The threat of firm closure may induce workers to make concessions in form of unpaid extra hours, and still lead to a higher likelihood of dismissal for these workers. This issue clearly needs further investigation.

A number of additional extensions is required to refine the analysis and to further investigate some findings of the model. One feature that we want to implement is an additional correction for selectivity bias, as not only the probability to stay within the same firm for a certain period of time might be non-random but also the choice for a workplace according to overtime compensation. Workers might not be assigned randomly to jobs in which overtime hours are paid, credited on a working time account or not paid at all. As a consequence, the estimates of the logit model might be biased, as the effect of unpaid overtime hours on future payoffs might be confused with the worker's underlying choice for a particular job with or without unpaid hours. To correct for this selectivity, the probability of a worker to be in a workplace with paid, leisure compensated, or unpaid overtime should be estimated in the first stage. However, the difficulty is that the SOEP does not provide information on the general overtime compensation policy of the firm. Therefore, no information is provided on which type of overtime would have been available to workers who currently do not work overtime. Additionally, it is not known whether any compensation would have been available for unpaid overtime workers, i.e. if they had the option to work either compensated or uncompensated extra hours. However, to approximate this probability, a reduced form selection model might be used to estimate the probability of observing unpaid overtime.

Furthermore, it might be important to treat the three different outcomes of the analysis above not independently from one another, but consider them as simultaneous decisions by the firm. In addition, one might not only consider the probabilities of excess wage growth, promotions, and layoffs, but also take into account other possible changes which might occur in the workplace, such as separations due to voluntary quits or firm closedown. If the complete set of possible events in a employer-employee relationship can be defined, a nested logit model might be estimated which assumes a sequence of choices. This model would take into account more events than just the three considered above, and therefore represent the choices in an employment relationship in a more realistic way. Lastly, the analysis might be extended to a dynamic framework. Modeling the dynamic aspects of choices of both the worker and the firm by taking into account variables from the past might help to further improve the analysis of future consequences of working hours.

Appendix

Table A1: Summary Statistics of Variables Used in the Logit Model

Variable	Description	Mean (SD) West	Mean (SD) East
	Dependent Variables		
Incgrowth	Income growth: 1=excess growth in monthly income, no=0		
- tplus1	- in the subsequent year	0.09	0.10
- tplus2	- within the two subsequent years	0.18	0.19
- tplus3	- within the three subsequent years	0.25	0.26
Promo	Promotion: 1= being promoted, no=0		
- tplus1	- in the subsequent year	0.01	0.01
- tplus2	- within the two subsequent years	0.03	0.02
- tplus3	- within the three subsequent years	0.05	0.04
Dismissal	Dismissal: 1= being dismissed, no=0		
- tplus1	- in the subsequent year	0.02	0.06
- tplus2	- within the two subsequent years	0.04	0.11
- tplus3	- within the three subsequent years	0.06	0.15
	Working Hours		
Contrh	Contractual hours per week	38.28(2.21)	39.78(2.04)
Desired	Desired hours per week	37.39(6.53)	38.22(7.53)
Unpaidovh	Unpaid overtime hours per week	0.68(2.47)	0.80(2.79)
Paidovh	Paid overtime hours per week	0.56(2.14)	0.57(2.18)
Leispaidovh	Partly paid/leisure compensated overtime hours per week	0.67(2.11)	0.62(2.05)
Leisovh	Leisure compensated overtime hours per week	0.75(1.89)	0.73(1,83)
	Socio-Demographic Variables		
Age	Age in years	38.57(9.84)	40.44(9.58)
Married	Marital status: 1= married or cohabiting, else = 0	0.84(0.37)	0.89
Child0_3	Children 0-3 years old: 1= yes, no=0	0.11	0.07
Child4_6	Children 4-6 years old: 1= yes, no=0	0.11	0.07
Child7_10	Children 7-10 years old: 1= yes, no=0	0.14	0.09
Child11_16	Children 11-16 years old: 1= yes, no=0	0.34	0.57
	Wage, Education and Work Experience		
Mincome	Monthly income including extra payments, in Euros	2,799.5(1,327)	1,867.1(764.8)
Edu	Length of education in years	38.57(9.84)	40.44(9.58)
Tenure	Work experience at the same employer in years	10.82(9.15)	8.80(8.95)
Expfull	Previous work experience as full-time employee in years	18.01(10.22)	20.37(9.80)
Exppart	Previous work experience as part-time employee in years	1.07(2.74)	1.12(2.82)
	Job Characteristics		
Public	Public sector: 1=yes, else=0	0.21	0.31
Change	Change of job: 1=yes, else=0	0.10	0.12
Tempjob	Temporary job: 1= yes, no=0	0.03	0.04
Jobsat	Satisfaction with job: 1= satisfied, else=0	0.81	0.77
Job0	No training necessary for the job: 1=yes, else=0; Reference category	0.01	0.01
Job1	Briefing or courses necessary for the job: 1=yes, else=0	0.22	0.20
Job2	Vocational training necessary for the job: 1=yes, else=0	0.62	0.59
Job3	College/University necessary for the job: 1=yes, else=0	0.12	0.11
Occ1	Occupation: 1=Manager, else=0	0.05	0.04

Occ2	Occupation: 1=Professional, else=0	0.13	0.12
Occ3	Occupation: 1=Technician, else=0	0.25	0.22
Occ4	Occupation: 1=Clerk, else=0	0.16	0.12
Occ5	Occupation: 1=Service/Sales worker, else=0	0.06	0.07
Occ6	Occupation: 1=Craft worker, else=0	0.22	0.27
Occ7	Occupation: 1=Plant/machine operator, else=0	0.09	0.10
Occ8	Occupation: 1=Elementary occupation, else=0	0.04	0.06
Bluecol	Blue-collar worker=1, else=0	0.35	0.45
Bluecol0	Blue-collar worker: 1=unskilled, else=0; Reference category	0.01	0.01
Bluecol1	Blue-collar worker: 1=skilled, else=0	0.09	0.09
Bluecol2	Blue-collar worker: 1=semiskilled, else=0	0.19	0.29
Bluecol3	Blue-collar worker: 1=foreman, else=0	0.03	0.04
Bluecol4	Blue-collar worker: 1=master, else=0	0.01	0.02
Whiteco0	White-collar worker: 1=foreman, else=0; Reference category	0.02	0.01
Whiteco1	White-collar worker: 1=without vocational training, else=0	0.02	0.03
Whiteco2	White-collar worker: 1=with vocational training, else=0	0.06	0.07
Whiteco3	White-collar worker: 1=qualified occupation, else=0	0.33	0.26
Whiteco4	White-collar worker: 1=highly qualified occupation, else=0	0.20	0.16
Whiteco5	White-collar worker: 1=executive function, else=0	0.02	0.01
	Industry (Reference Category: All Other Branches)		
Branch1	Branch: 1= Mining, oiling, and gas, else=0	0.01	0.01
Branch2	Branch: 1= Textiles, else=0	0.01	0.01
Branch3	Branch: 1= Wood and Paper, else=0	0.03	0.02
Branch4	Branch: 1= Chemicals, else=0	0.08	0.04
Branch5	Branch: 1= Metal, else=0	0.08	0.07
Branch6	Branch: 1= Vehicle and engine construction, else=0	0.16	0.06
Branch7	Branch: 1= Energy/Water, else=0	0.02	0.03
Branch8	Branch: 1= Construction, else=0	0.07	0.15
Branch9	Branch: 1= Wholesale and retail, else=0	0.12	0.10
Branch10	Branch: 1= Hotel and restaurant, else=0	0.01	0.01
Branch11	Branch: 1= Transport, else=0	0.05	0.08
Branch12	Branch: 1= Banking and insurance, else=0	0.07	0.04
Branch13	Branch: 1= Health sector, else=0	0.08	0.11
Branch14	Branch: 1= Other services, else=0	0.13	0.20
	Firm size		
Size0	Firm size < 5 employees; Reference category	0.03	0.06
Size1	Firm size > 5 and <20 employees	0.12	0.18
Size2	Firm size > 20 and < 200 employees	0.27	0.35
Size3	Firm size > 200 and < 2000 employees	0.28	0.23
Size4	Firm size > 2000 employees	0.29	0.17
	Macro Variables		
U_District	Regional unemployment rate at the district level	9.39	17.67
Growth	Real GDP growth rate of the worker's industry	3.57	8.32
	Observations	12,615	8,264

Source: SOEP, 1993–2004 (own calculations)
Sample: German male and female full-time employees, age 20-60, civil servants and self-employed persons excluded

Table A2: Probit Estimates: Probability of Staying in the Same Firm (West Germany)

	Male Workers			Female Workers		
	t + 1	**t + 2**	**t + 3**	**t + 1**	**t + 2**	**t + 3**
Age	0.014	0.041	0.042	-0.027	-0.010	-0.022
	(0.57)	(1.96)*	(1.97)*	(0.81)	(0.35)	(0.75)
Age2	0.000	-0.000	-0.000	0.001	0.001	0.001
	(0.73)	(0.33)	(0.30)	(1.91)	(1.63)	(2.01)*
Married	-0.020	0.061	0.012	0.077	0.008	-0.030
	(0.26)	(0.93)	(0.19)	(0.85)	(0.10)	(0.36)
Mincome_partner	-0.000	-0.000	-0.000	-0.000	0.000	0.000
	(2.02)*	(2.89)**	(2.66)**	(0.27)	(0.53)	(0.81)
Child0_3	-0.073	-0.061	-0.031	-0.028	0.010	-0.066
	(1.09)	(1.00)	(0.50)	(0.26)	(0.10)	(0.63)
Child4_6	-0.101	-0.053	-0.013	-0.041	-0.208	-0.300
	(1.51)	(0.87)	(0.21)	(0.32)	(1.76)	(2.36)*
Child7_10	-0.033	-0.049	-0.022	0.108	0.078	-0.007
	(0.54)	(0.89)	(0.40)	(0.69)	(0.55)	(0.05)
Child11_16	0.029	-0.003	0.004	0.057	0.103	0.120
	(0.51)	(0.06)	(0.09)	(0.65)	(1.30)	(1.53)
Mincome	0.000	0.000	0.000	0.000	0.000	0.000
	(5.07)**	(6.77)**	(7.48)**	(0.96)	(0.84)	(1.91)
Jobsat	0.532	0.506	0.468	0.537	0.532	0.523
	(10.29)**	(10.78)**	(10.03)**	(7.41)**	(7.91)**	(7.58)**
Public	0.410	0.518	0.577	0.307	0.371	0.471
	(5.18)**	(7.47)**	(8.67)**	(3.65)**	(4.84)**	(6.08)**
Overtime hours	-0.021	-0.028	-0.032	-0.010	-0.025	-0.037
	(3.65)**	(5.47)**	(6.24)**	(0.91)	(2.49)*	(3.54)**
Regional unemployment	0.005	0.000	-0.003	0.002	0.002	0.014
	(0.51)	(0.04)	(0.37)	(0.14)	(0.14)	(1.21)
GDPgrowth	0.000	0.000	-0.014	-0.019	-0.007	-0.011
	(0.00)	(0.02)	(2.86)**	(1.90)	(0.91)	(1.36)
Constant	0.234	-0.767	-0.916	1.061	0.309	0.121
	(0.53)	(2.01)*	(2.38)*	(1.87)	(0.63)	(0.24)
Log-Likelihood	-1668.6	-2289.5	-2466.6	-829.5	-1069.91	-1075.5
Pseudo R2	0.097	0.105	0.105	0.115	0.114	0.135
Observations	8,998	7,772	6,560	4,036	3,309	2,653

Source: SOEP, 1993–2004 (own calculations)

Sample: German male and female full-time employees, age 20-60, civil servants and self-employed persons excluded. *significant at the 5% level. **significant at the 1% level. Robust z statistics in parentheses.

Table A3: Logit Estimates: Probability of Payoff in the Next Year (West Germany), Odds Ratios

	Excess Earnings Growth		**Promotion**		**Layoff**	
	Men	**Women**	**Men**	**Women**	**Men**	**Women**
Unpaidovh	1.041	1.084	0.998	0.900	1.022	1.056
	(2.63)**	(2.59)**	(0.04)	(1.64)	(0.82)	(1.62)
Paidovh	0.990	1.060	0.948	0.898	0.940	0.926
	(0.60)	(0.79)	(0.77)	(0.43)	(1.65)	(0.63)
Leisovh	0.963	1.052	1.044	1.070	0.911	0.900
	(1.40)	(1.69)	(1.10)	(1.28)	(1.88)	(1.31)
Leispaidovh	1.045	1.102	1.092	0.990	0.890	0.900
	(2.70)**	(2.78)**	(2.98)**	(0.16)	(1.84)	(1.46)
Contrh	1.038	0.950	0.969	0.874	1.011	1.038
	(2.40)*	(1.50)	(0.65)	(1.72)	(0.38)	(0.77)
Desired	1.019	1.002	1.042	1.030	0.990	1.005
	(2.65)**	(0.21)	(2.31)*	(1.39)	(0.90)	(0.40)
Age	0.988	0.966	1.212	1.004	0.898	1.143
	(0.19)	(0.51)	(1.01)	(0.01)	(0.96)	(1.09)
Age2	0.999	1.000	0.996	1.000	1.002	0.998
	(0.67)	(0.06)	(1.48)	(0.06)	(1.40)	(1.06)
Married	1.141	1.259	1.015	0.814	0.827	0.667
	(1.16)	(1.40)	(0.06)	(0.57)	(0.93)	(1.46)
Edu	0.907	0.964	2.927	0.538	0.987	0.985
	(0.61)	(0.12)	(2.25)*	(0.91)	(0.04)	(0.03)
Edu2	1.006	1.007	0.964	1.029	0.996	0.999
	(0.98)	(0.57)	(2.14)*	(1.10)	(0.36)	(0.03)
Tenure	0.986	1.000	1.197	1.258	0.865	0.896
	(0.90)	(0.01)	(3.11)**	(2.56)*	(4.55)**	(1.85)
Tenure2	1.000	1.001	0.996	0.990	1.002	1.002
	(0.93)	(0.55)	(2.01)*	(3.06)**	(2.95)**	(0.95)
Expfull	1.024	1.035	0.893	0.951	0.939	1.029
	(0.74)	(0.89)	(1.15)	(0.36)	(1.05)	(0.39)
Expfull2	1.000	1.000	1.002	1.001	1.001	0.999
	(0.29)	(0.12)	(0.82)	(0.34)	(0.80)	(0.65)
Mincome	1.000	0.998	1.000	1.000	1.000	1.000
	(5.26)**	(7.15)**	(1.26)	(2.33)*	(3.74)**	(0.74)
Change	1.298	1.317	3.785	4.585	1.641	2.222
	(2.13)*	(1.48)	(4.34)**	(3.76)**	(2.53)*	(2.53)*
Tempjob	1.679	1.467	0.652	0.744	0.875	0.978
	(2.83)**	(1.58)	(0.73)	(0.45)	(0.43)	(0.05)
Occ1	1.144	0.649	0.814	1.748	1.517	0.880
	(0.48)	(0.75)	(0.32)	(8.20)**	(0.82)	(0.16)
Occ2	1.370	1.368	0.471	1.084	1.051	0.514
	(1.15)	(0.62)	(1.24)	(8.41)**	(0.09)	(0.75)
Occ3	1.170	0.571	0.758	1.162	1.008	0.680
	(0.65)	(1.38)	(0.47)	(8.77)**	(0.02)	(0.60)
Occ4	0.945	0.617	0.811	1.580	0.911	0.522
	(0.22)	(1.17)	(0.33)	(8.73)**	(0.22)	(0.96)
Occ5	0.770	0.416	0.969	2.191	1.262	0.604
	(0.79)	(2.11)*	(0.04)	(6.04)**	(0.46)	(0.76)
Occ6	1.276	0.622	0.850	1.442	1.468	0.777
	(1.12)	(1.06)	(0.26)	(8.99)**	(1.15)	(0.33)
Occ7	1.302	1.924	0.927	-	0.982	0.312
	(1.19)	(1.58)	(0.12)	-	(0.05)	(1.03)
Skilled_blue	0.987	0.790	0.512	7.880	0.482	0.851
	(0.09)	(0.52)	(1.60)	(9.90)**	(3.21)**	(0.18)
Unskilled_white	1.358	1.870	0.817	-	0.657	2.763
	(1.30)	(1.66)	(0.32)	-	(0.90)	(1.57)
Skilled_white	1.167	1.413	1.005	2813	0.794	1.913

	(0.88)	(0.95)	(0.01)	(8.28)**	(0.86)	(1.08)
Public	0.604	0.907	1.211	1.287	0.300	0.221
	(3.22)**	(0.46)	(0.56)	(0.48)	(2.61)**	(3.27)**
Size1	1.124	1.115	2.752	1.537	1.074	0.973
	(0.49)	(0.33)	(0.88)	(2.40)*	(0.25)	(0.07)
Size2	1.230	1.379	1.969	1.170	0.805	0.677
	(0.89)	(0.97)	(5.98)**	(2.66)**	(0.75)	(0.95)
Size3	1.397	1.726	1.872	1.091	0.722	0.597
	(1.40)	(1.58)	(8.74)**	(2.91)**	(1.00)	(1.12)
Size4	1.572	1.837	1.462	1.719	0.515	0.314
	(1.85)	(1.71)	(3.05)**	(3.03)**	(1.82)	(2.09)*
Branch1	0.898	-	-	-	4.231	-
	(0.22)	-	-	-	(1.74)	-
Branch2	0.520	0.219	-	-	1.491	1.572
	(1.21)	(2.38)*	-	-	(0.66)	(0.60)
Branch3	1.656	0.860	2.953	2.361	0.576	0.938
	(2.08)*	(0.33)	(1.96)*	(0.74)	(1.01)	(0.09)
Branch4	0.936	0.433	0.686	0.604	0.904	0.835
	(0.35)	(2.02)*	(0.67)	(0.48)	(0.27)	(0.24)
Branch5	1.032	0.562	0.703	4.720	0.830	1.300
	(0.18)	(1.32)	(0.65)	(1.68)	(0.52)	(0.34)
Branch6	1.230	0.870	1.174	2.357	1.078	0.208
	(1.36)	(0.40)	(0.37)	(1.09)	(0.26)	(1.45)
Branch7	1.292	3.764	2.646	-	0.407	-
	(0.90)	(1.88)	(1.74)	-	(0.81)	-
Branch8	1.078	0.894	0.827	3.122	1.130	2.072
	(0.44)	(0.20)	(0.27)	(1.07)	(0.43)	(1.10)
Branch9	1.029	0.871	0.833	2.534	0.750	1.413
	(0.16)	(0.49)	(0.34)	(1.02)	(0.97)	(0.79)
Branch10	1.780	1.176	-	41.986	0.922	2.507
	(1.28)	(0.27)	-	(2.59)**	(0.12)	(1.52)
Branch11	0.822	0.720	1.492	-	1.078	0.604
	(0.86)	(0.74)	(0.76)	-	(0.19)	(0.45)
Branch12	1.591	1.101	1.272	1.698	0.260	0.459
	(2.01)*	(0.28)	(0.49)	(0.60)	(1.29)	(0.94)
Branch13	0.964	0.965	1.392	2.082	0.626	1.295
	(0.14)	(0.11)	(0.54)	(0.69)	(0.76)	(0.59)
Branch14	0.875	0.639	1.826	2.155	0.625	1.312
	(0.69)	(1.40)	(1.21)	(0.75)	(1.19)	(0.55)
year1994	1.154	0.664	1.726	2.424	0.867	1.516
	(0.88)	(1.53)	(1.04)	(1.49)	(0.41)	(0.74)
year1995	0.828	0.312	1.354	0.791	1.018	1.661
	(1.10)	(3.99)**	(0.56)	(0.36)	(0.06)	(0.96)
year1996	1.127	0.798	2.512	1.091	1.723	0.879
	(0.72)	(0.82)	(1.81)	(0.14)	(1.66)	(0.21)
year1997	1.304	0.874	2.914	0.107	1.025	1.252
	(1.66)	(0.49)	(2.17)*	(1.76)	(0.07)	(0.37)
year1998	0.886	0.609	2.017	0.807	1.767	2.216
	(0.70)	(1.72)	(1.37)	(0.34)	(1.67)	(1.48)
year1999	1.071	0.779	2.638	0.496	0.837	0.802
	(0.41)	(0.84)	(1.91)	(0.86)	(0.47)	(0.37)
year2000	1.333	0.984	3.074	0.984	0.681	0.948
	(1.65)	(0.05)	(2.05)*	(0.02)	(0.93)	(0.09)
year2001	1.327	0.639	3.205	0.706	1.353	1.395
	(1.56)	(1.44)	(2.16)*	(0.47)	(0.74)	(0.57)
year2002	1.262	1.154	2.156	0.595	1.147	0.712
	(1.35)	(0.49)	(1.43)	(0.82)	(0.37)	(0.55)
year2003	-	-	0.991	0.562	1.291	1.876
	-	-	(0.01)	(0.91)	(0.65)	(1.19)
GDP_growth	0.999	0.975	1.034	0.970	1.001	0.944
	(0.66)	(0.83)	(1.12)	(0.67)	(0.93)	(1.49)

PosGDPgrowth	1.071	1.744	0.761	0.946	1.041	1.518
	(0.63)	(1.67)	(0.69)	(0.09)	(0.20)	(0.87)
Region1	1.233	0.976	0.686	1.012	1.068	0.061
	(0.56)	(0.05)	(0.53)	(0.01)	(0.11)	(2.52)*
Region2	1.775	1.955	1.656	3.210	0.304	0.374
	(1.32)	(1.14)	(0.78)	(0.83)	(1.02)	(1.38)
Region3	1.815	1.065	0.581	2.813	0.586	0.190
	(1.87)	(0.16)	(0.95)	(1.13)	(1.05)	(3.10)**
Region4	2.440	1.624	1.423	-	1.052	-
	(2.03)*	(0.64)	(0.37)	-	(0.07)	-
Region5	1.646	1.417	0.387	1.641	0.779	0.258
	(1.62)	(0.97)	(1.76)	(0.55)	(0.51)	(2.96)**
Region6	1.858	0.838	0.795	0.266	0.990	0.244
	(1.92)	(0.43)	(0.39)	(1.44)	(0.02)	(2.10)*
Region7	1.678	1.374	0.584	1.371	0.870	0.213
	(1.58)	(0.78)	(0.91)	(0.29)	(0.25)	(2.23)*
Region8	1.209	1.168	0.658	1.412	0.638	0.196
	(0.60)	(0.40)	(0.79)	(0.36)	(0.75)	(2.63)**
Region9	1.405	1.311	0.408	1.503	0.946	0.198
	(1.09)	(0.72)	(1.65)	(0.44)	(0.10)	(2.58)**
Mills_Men	1.065		37.093			
	(0.10)		(2.37)*			
Mills_Women		0.267		44.954		
		(1.25)		(1.61)		
Child0_3					0.851	1.135
					(0.65)	(0.37)
Child4_6					0.608	1.042
					(1.75)	(0.11)
Child7_10					1.202	0.983
					(0.85)	(0.04)
Child11_16					0.975	0.617
					(0.15)	(1.52)
Regional Unemployment					1.037	0.968
					(0.87)	(0.61)
Log-Likelihood	-2,546.0	-896.6	-508.1	-213.7	-837.9	-383.9
Pseudo R2	0.053	0.122	0.202	0.266	0.183	0.187
Observations	7,802	3,466	8,350	3,260	10,887	5,081

Source: SOEP, 1993–2004 (own calculations)
Sample: German male and female full-time employees, age 20-60, civil servants and self-employed persons

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