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

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Abstract

Whereas the number of paid overtime hours declined over the last decade, a different trend can be observed for unpaid overtime work in Germany. We look at the future consequences for overtime workers, and therefore investigate the investment character of working time. We examine whether unpaid extra hours induce a higher likelihood of promotion and pay rise, and whether they reduce the risk of losing the job. Using longitudinal micro data from the GSOEP for the years 1991 to 2002 we find significant positive effects of unpaid overtime work on future payoffs, but also a positive impact on the probability of job loss. Therefore, we find only partial evidence for the investment character of unpaid overtime.

Key words: overtime, unpaid work, promotion, wage growth, layoff

JEL classification: J2, J3, J4

The data used in this study are readily available from the German Institute for Economic Research (DIW) as a public-use file containing 95% of the sample (at website address: http://www.diw.de/soep). For reasons of data protection, parts of the analyses have been conducted at the DIW, Berlin. My thank goes to Katharina Spieß, and Gundi Knies for making sensitive data available. Financial support was received by the Deutsche Forschungsgemeinschaft and the SFB 649 "Economic Risk". All remaining errors are mine.

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1. Introduction

Whereas the number of contractual hours and paid overtime hours declined over the last years and decades in Germany, a different trend can be observed for unpaid overtime work that refers to the time actually worked in excess of the contractual hours which is neither paid nor compensated with time-off. Both the incidence and the average amount of unpaid overtime rose during the past decade in Germany. This raises the question as to what causes workers to supply unpaid overtime hours, and, related to that, what are the future consequences for these workers. In this study we focus on the investment character of overtime which might be one of the possible explanations why individuals might want to work more than their contractual hours and even offer them to the company for free. The possible future benefits from working a greater amount of unpaid overtime hours are not only larger or more rapid salary increases and a higher probability of promotion, but also a lower probability of lay-off. Future payoffs from working overtime might be consistent with a variety of theories. It might be simply the cost aspect that leads firms to choose overtime workers to be promoted or retained in the firm, since they provide relatively cheap labor to their employer, in which case the payoffs might be interpreted as a reward in the sense of gift exchange. Unpaid overtime may also be interpreted as a means of a worker to signal productivity, motivation, or loyalty to the firm which separates workers on the base of this signal. Furthermore, the theory of deferred compensation and the human capital theory might also be used to predict a positive relationship between present working hours and future outcomes. The objective of this empirical study is to analyze whether working hours can be interpreted as an investment. We investigate whether the supply of unpaid extra hours leads to higher future wages, to higher promotion probabilities and to a lower risk of losing the job.

Among the sparse literature on unpaid overtime work, there is almost none focusing on the investment character of extra hours. One of the recent studies on unpaid overtime is by Bell

and Hart (1998) who investigate economic reasons for employees undertaking unpaid overtime, and find that adjusting wages for unpaid hours leads to a decrease in returns to education, experience and tenure in Great Britain. In a continuative study Bell, Hart, Hübler, and Schwerdt (2000) show that in Germany less overtime and far less unpaid overtime is worked than in the UK and that the wage gap between the two countries is widened, when effective hourly wage rates (in consideration of unpaid overtime) are compared. Bauer and Zimmermann (1999) investigate the determinants of working overtime and overtime compensation in Germany and conclude that reducing overtime has no positive employment effect since mainly the highly skilled work overtime, which is in most cases either unpaid or compensated with leisure. Hübler (2002) analyzes the relationship between computer use at work and unpaid overtime and finds that managers who use a computer work more unpaid extra hours than others in Germany. This leads him to the conclusion that there are no effective computer wage differentials.

A first evidence on the investment character of working hours in general is given by Bell and Freeman (2001). They compare actual working hours in the US and in 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 conclude that the greater hours worked by Americans can be explained in terms of forward-looking labor supply responses to differences in earnings inequality between the two countries. Booth, Francesconi, and Frank (2003) also find empirical evidence for the forward looking labor supply model using British data. They show that the amount of overtime correlates with subsequent promotions in a significantly positive way. Supportive evidence for the investment character of unpaid extra hours is given by Pannenberg (2005) who investigates long-term effects of unpaid overtime work in West Germany. He finds 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. Anger (2005) analyzes the differences in unpaid overtime between East and West Germany, and investigates whether workers use unpaid extra hours as a signal of productivity so as to reduce the risk of losing their job. Empirical evidence is found for a positive relationship between the regional unemployment rate and the supply of unpaid overtime hours for male workers in West Germany.

In this paper we test the forward looking labor supply model by investigating the relationship between unpaid overtime and promotion probability, wage growth, and the risk of unemployment. Using longitudinal micro data from the German Socio Economic Panel Study (GSOEP) for the years 1991 to 2002 we investigate whether a higher number of unpaid overtime hours involves a higher promotion probability, higher wages, and a lower risk of losing the job. Our results show a slightly higher probability of promotion and pay rise arising from unpaid overtime work for some worker groups. However, we also find that unpaid extra hours do not help to prevent future layoffs. Furthermore, other forms of overtime and contractual working hours are equally important for the determination of the probability of wage increase and promotion. This implies that there is only partial empirical evidence for a positive relationship between unpaid overtime and future payoffs.

2. Data

The data used in this study were made available by the German Socio-Economic Panel Study (GSOEP) at the German Institute for Economic Research (DIW) in Berlin. The GSOEP is a representative longitudinal micro-database that provides a wide range of socio-economic information on private households in Germany. The yearly data were first collected from about 12,200 randomly selected adult respondents (in 6,000 families) in the former West

Germany in 1984. After German reunification in 1990, the GSOEP was extended by about 4,500 persons (in 2,200 families) from the former East Germany. In the most recent wave, for 2002, about 23,000 respondents were participating in the panel study. The GSOEP data is available as a public-use file containing 95% of the GSOEP sample, with some variables omitted for reasons of data protection (see Wagner et al., 1993, or for more detailed information, Haisken-DeNew and Frick, 2000).

We use GSOEP data from 1991 to 2002 for male and female East and West German full-time employees aged between 20 and 65, excluding foreigners, civil servants, self-employed persons, and workers employed in the agricultural sector. Respondents with missing information on working hours and other crucial variables are dropped. We only use waves from 1991 on, since there was no information on East German workers before that year. Our unbalanced panel includes only those respondents who participate in at least two subsequent waves of the survey in order to control for individual unobserved heterogeneity. In total, the sub-sample consists of about 36,000 person-year observations, with 23,000 being male and 13,000 female.

The GSOEP provides detailed information on whether overtime is worked, on the amount of overtime hours per month and on overtime compensation.[1] 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 dependent variables we use a dummy variable for wage increase, for being promoted, and for being laid off in the next year, within the next two years, and within the next three years. For

[1] The original questions in the GSOEP 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].

the wage information we use not only monthly gross earnings but also extra payments, such as Christmas bonus, holiday pay, income from profit sharing, and other bonuses. Extra payments have become increasingly important in recent years: Pierce (1999) finds that excluding extra payments from earnings tends to understate wage differentials. Since monthly labor income overstates the remuneration of workers whose weekly hours of work exceed 40, it would be appropriate to use the effective hourly wage rate by dividing gross earnings by actual working hours. However, hourly wages might understate the earnings of managers and other workers who work long hours. Furthermore, using a wage measure which includes actual working hours would cause an endogeneity problem, since actual weekly hours is the sum of the contractual work week plus overtime. Therefore, this study uses the wage rate obtained by dividing gross earnings by contractual hours plus paid overtime hours in order to prevent differences in paid working hours from distorting the estimates.

The GSOEP does not provide direct information on promotions. Therefore, we construct a promotion dummy by combining information on intra-firm changes of workers with an evaluation of their new position. 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. In our sample about 9% of the respondents have experienced a promotion during the considered period. The third dependent variable, experience of layoff, has been constructed by combining information on the ending of an employment and the stated reason for the job leave. Since the respondents provide the exact month in which they leave their job, it is possible to assign a dismissal to the correct year, which is also done with the information on promotion. In the estimations of the layoff probability, we also add regional unemployment rates to the covariates which are provided by the Federal Statistical Office in Germany and available on the state level. Furthermore, we include unemployment rates by employment office district (“Arbeitsamtbezirke”) that we

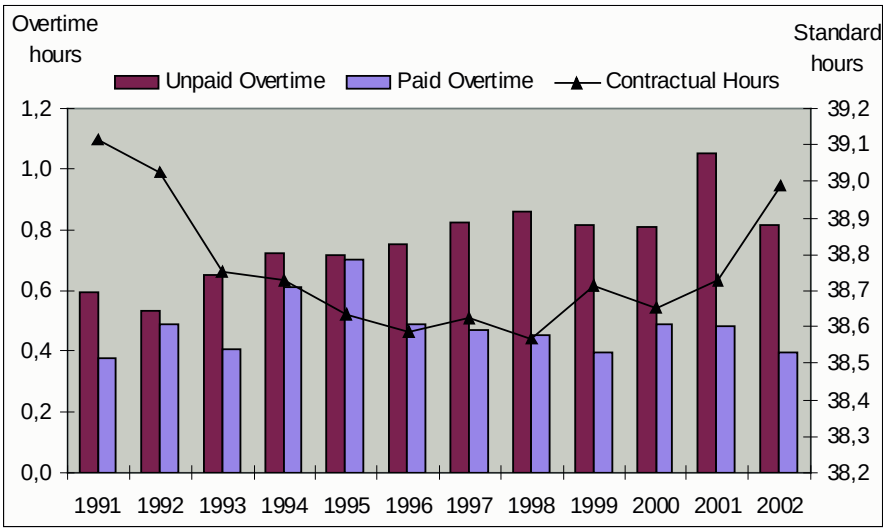
assign to the households according to their zip codes, which are collected since 1993.[2] When estimating the layoff probability, we also include information on a person's partner as well as on dependent children living in the household, since these characteristics might influence the layoff decision of a firm which has to take into account social criteria as agreed with the works council. In the estimations of the promotion probability, we include the information on whether a worker changed his job recently, whereas we exclude all job movers in the other estimations. Further independent variables in all estimations are the length of affiliation of a worker with his company, and whether he holds a temporary or a permanent job. All regressions include control variables such as education, experience, age, marital status, as well as firm size, occupation, industry, and year dummies (see Table A1 in the appendix). All regressions are run separately for men and women as well as for East and West German workers.[3]

3. Overtime Work and Standard Working Hours

The following graphs and tables show time trends for overtime work and contractual working hours, which differ substantially over the past decade. The contractual weekly working hours for the workers in our sample was about 38.7 hours in 1991 in West Germany, and it decreased during the 90ies to 38.4 hours in 2002. In the same period the standard work week in the East was reduced from 40.6 hours to 40 hours which lead to a slight narrowing of the gap between contractual working hours in the old and the new states. As can be seen in Graph 1 the average contractual hours for all employees has shrunk from about 39.1 hours to 38.6 hours per week and then increases slightly.

[2] Due to the sensitivity of the data analysis at the zip code level, all concerning analyses have been conducted at the German Institute for Economic Research (DIW), Berlin, under special data protection requirements.
[3] 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.

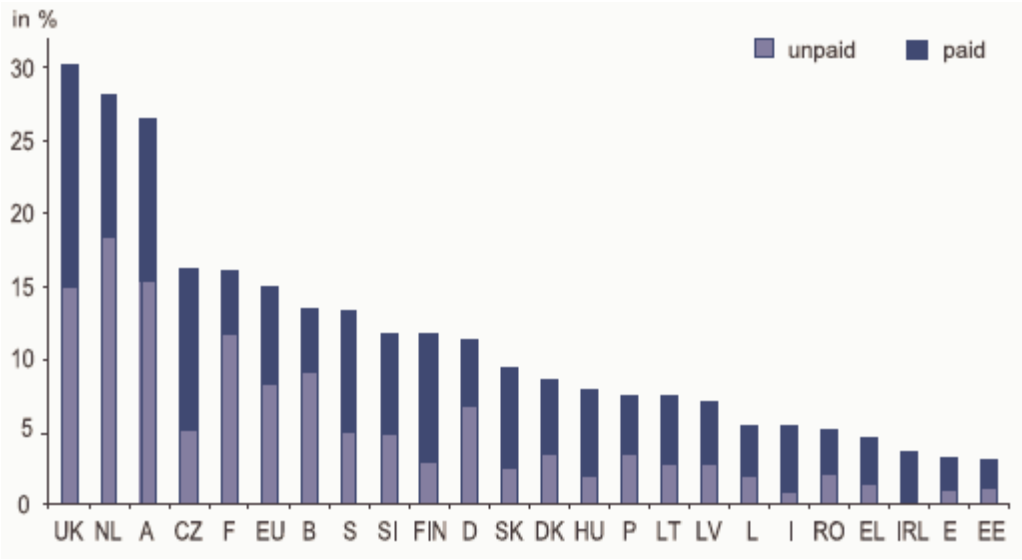
Graph 1: Standard working hours and average overtime hours per week



Source: GSOEP, 1991-2002 (own calculations)
Sample: German male and female full-time employees, age 20-65, civil servants and self-employed persons excluded

At the same time, there was a constant upward trend for the average amount of unpaid overtime, which reached about 0.8 weekly hours per worker, while the average amount of paid overtime work is only about 0.4 hours a week. Graph 2 shows that the importance of unpaid overtime is not only a German phenomenon.

Graph 2: Paid and unpaid overtime incidence in the EU and the Accession Countries, 2001 (in % of employees)



Source: European Commission (2003)

In almost all European countries, a substantial proportion of workers supplies extra hours for free. In countries as the UK or the Netherlands, even more than 15% of all employees worked unpaid overtime in 2002, while this incidence is only 7% in Germany. However, compared to the countries which have approximately the same incidence of overall overtime, as e.g. Sweden or Finland, there is a clearly higher percentage of uncompensated overtime in Germany.

In Table 1 the proportion of employees working unpaid overtime is shown as well as the percentage of workers working paid overtime. It is striking that in the most recent year, 2002, the percentage of workers with unpaid overtime work is strictly higher than that of workers with paid overtime.

Table 1: Incidence of Overtime (Unconditional and Conditional on Overtime Work, in %)

	Unpaid Overtime				Paid Overtime			
	Employees working overtime (conditional)		All employees (unconditional)		Employees working overtime (conditional)		All employees (unconditional)	
	Men	Women	Men	Women	Men	Women	Men	Women
1991	16.30	18.24	9.35	6.21	13.94	13.19	14.05	9.59
1992	15.68	17.42	9.54	5.48	15.80	12.84	14.32	10.66
1993	17.31	17.04	10.30	5.55	16.26	14.91	15.20	11.63
1994	18.55	17.54	9.81	5.49	20.61	12.80	17.86	11.34
1995	18.36	18.43	10.26	6.15	18.77	12.11	16.79	11.45
1996	15.86	20.48	10.06	5.94	18.20	14.80	15.36	11.58
1997	18.04	19.45	11.34	5.72	12.79	5.01	12.08	4.08
1998	21.46	20.03	10.40	5.32	10.94	4.65	10.69	4.49
1999	19.07	17.40	10.38	5.14	12.87	4.89	11.98	3.74
2000	18.50	20.16	9.50	4.97	13.20	4.35	11.90	5.62
2001	16.31	15.57	8.89	5.81	13.67	7.01	11.46	5.34
2002	20.75	22.12	10.06	5.69	9.53	5.10	9.88	4.02

Source: GSOEP, 1991-2002 (own calculations)
Sample: German male and female full-time employees, age 20-65, civil servants and self-employed persons excluded

This is true for the incidence of unpaid overtime with the base of all employees (unconditional) as well as for the unpaid overtime incidence based on overtime workers only (conditional). The most striking differences occur among female employees with overtime work: While 22% of them supplied unpaid extra hours, only 5% of them worked paid overtime in 2002. However, looking at the first years of the sample period, it becomes obvious that this was not always the case. At the beginning of the 90ies there was a higher proportion of employees with paid overtime than with unpaid overtime both among male and female workers. The increase in the proportion of overtime workers with unpaid extra hours and the slight decrease in the percentage of overtime workers with paid hours lead to a substantial gap between paid and unpaid overtime incidence. It is striking that the difference between unpaid and paid overtime incidence is much bigger for workers with overtime work (conditional incidence). In order to have a more complete picture of the issue of overtime compensation it is necessary to compare unpaid overtime not only with paid overtime, but also with other forms of overtime compensation. Therefore, the development of the incidence of overtime compensation between 1991 and 2001 is given in table 2.

Table 2: Shares of Overtime Compensation (in %)

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
West Germany												
Unpaid	17.7	15.9	20.9	22.8	21.2	22.0	22.1	22.6	19.7	17.7	16.3	22.2
Paid	16.0	19.0	19.5	20.8	21.4	20.0	15.7	15.4	11.6	13.6	12.2	8.2
Leisure	37.3	33.7	28.6	24.5	25.2	22.1	39.2	39.7	42.9	47.8	50.6	53.5
partly paid/ leisure	29.1	31.5	30.6	31.9	32.1	35.8	23.0	22.2	25.7	20.8	20.9	16.1
East Germany												
Unpaid	23.0	21.2	18.9	21.6	23.5	21.8	22.4	19.1	20.1	17.7	15.5	17.6
Paid	15.1	17.7	19.3	20.3	20.6	20.7	16.8	13.1	13.0	15.0	9.8	7.4
Leisure	27.1	31.6	27.9	26.6	26.5	25.4	38.5	39.3	43.5	41.0	51.1	54.7
partly paid/leisure	34.7	29.1	33.8	31.1	29.4	32.0	21.9	25.4	23.4	26.1	23.6	20.3

Source: GSOEP, 1991-2002 (own calculations)
Sample: German male and female full-time employees working overtime, age 20-65, civil servants and self-employed persons excluded

Furthermore, it is important to have a closer look at the subgroups of workers, since it has already been shown by other studies that unpaid overtime is particularly worked by white collar workers (Bauer und Zimmermann, 1999). This is clearly because blue collar workers are more strongly affected by binding wages and working hours that result from collective bargaining. The percentage of white and blue collar workers supplying unpaid overtime as well as the amount of unpaid overtime hours are shown in Table 3. The incidence of unpaid overtime is far higher for white collar workers than for blue collar workers. As percentage of the total number of employees, almost 19 percent of the white collar workers work extra hours for free in 2002, while this incidence is only about 4 percent for blue collar workers. With regard to the amount of unpaid overtime, blue collar workers supply on average at least one unpaid overtime hour less per week.

Table 3: Unpaid overtime incidence (in %) and amount of unpaid overtime hours (average weekly hours)

	White collar worker			Blue collar worker		
	Conditional on overtime work		Unconditional	Conditional on overtime work		Unconditional
Year	Incidence	Weekly hours	Incidence	Incidence	Weekly hours	Incidence
1991	22.0%	1.5	18.4%	3.3%	0.2	1.6%
1992	21.2%	1.2	18.6%	2.8%	0.1	1.9%
1993	21.3%	1.2	18.0%	4.4%	0.2	3.1%
1994	22.1%	1.4	17.6%	6.3%	0.4	3.6%
1995	22.6%	1.4	18.4%	3.6%	0.1	2.6%
1996	21.2%	1.4	18.0%	4.1%	0.2	3.0%
1997	22.3%	1.3	19.2%	2.3%	0.1	1.5%
1998	25.3%	1.7	19.2%	5.2%	0.3	3.4%
1999	23.0%	1.6	17.6%	5.8%	0.4	3.7%
2000	23.6%	1.6	17.0%	5.8%	0.4	3.9%
2001	20.5%	1.3	16.7%	5.4%	0.2	4.3%
2002	25.0%	1.6	18.6%	7.7%	0.4	4.4%

Source: GSOEP, 1991-2002 (own calculations)
Sample: German male and female full-time employees, age 20-65, civil servants and self-employed persons excluded

4. Theoretical Considerations and Econometric Analysis

The empirical evidence from the descriptive statistics above raises the question as to what drives people to supply an increasing number of unpaid hours. The growing importance of unpaid overtime work might be explained by a shift in working time preferences or stronger pressure from the firm side, but the reason might be more subtle, since overtime work might be unpaid today but lead to benefits in the future. Therefore, we investigate the investment character of unpaid overtime work and suggest a forward looking labor supply model (Bell and Freeman, 2001). Workers might regard unpaid overtime work as an investment and therefore voluntarily increase their labor supply for free in order to get a pay off in the future. The possible future benefits from working a greater amount of unpaid overtime hours are not only larger or more rapid salary increases (Pannenberg, 2005) and a higher probability of promotion (Booth, Francesconi, and Frank, 2003), but also a lower probability of lay-off.

Several theories can be considered to generate the positive relationship between present working hours and future outcomes. In a simple cost minimization framework, the additional productive hours in form of overtime lead firms to choose overtime workers to be promoted or retained in the firm, since they provide relatively cheap labor. 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 overtime, and therefore save fix or sunk cost that would arise in the case of new hires. Higher future wages for overtime workers might be interpreted as a reward in the sense of gift exchange (Akerlof, 1984). In addition, the human capital theory is capable of treating 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 long-term worker-employer relationships, where measuring output is difficult. 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.

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 the firm has no full information on worker productivity. The information asymmetry might lead to decisions on promotions, pay rises, and layoffs being on the basis of unpaid overtime or other characteristics, which are easier to observe than productivity. Workers might want to work longer hours and provide them even for free in order to increase the probability of pay rise and promotion, and to decrease the probability of being laid off. An equivalent reasoning is found in rat-race models (Landers, Rebitzer, and Taylor, 1996), where unequal outcome in success versus failure provokes a positive relationship between future pay off and current effort.

Suggesting the forward looking labor supply model, we investigate the effect of unpaid overtime work on possible future outcomes, which are pay rise, promotion, and job loss. We estimate the effect of unpaid overtime hours on the probability of promotion, pay rise, and layoff by using a model of the following structure (Greene 2000):

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

where $y^*_{i,t+1}$ is the latent propensity to get a payoff of the individual *i* in the future *t+1*, 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_{ε}^2. As $y_{i,t+1}^*$ is a latent variable, it is not observable. What one observes is

$$y_{i,t+1} = \begin{cases} 1 & if\ y_{i,t+1}^* > 0 \\ 0 & otherwise \end{cases} \tag{2}$$

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

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

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. Here, α_i differs across individuals but is constant over time. It hence accounts for intrinsic differences in 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.

In the first version of the model, we will estimate the probability of a layoff in the future, whereas in the second version, we use future promotion as the dependent variable. In a third version, we estimate the effect of unpaid overtime on the probability of a pay rise in the next period. For the first version of the model we expect a negative relationship between the amount of unpaid overtime hours and the probability of job loss, whereas in the second and the third version of the model we expect the relationship between unpaid overtime hours and the outcome variables to be negative.

5. Results

The following tables show the pooled, and random effects Logit estimates of the amount of unpaid overtime and other working hours on the probability of pay rise, promotion and layoff. When the outcome variables are regressed on unpaid overtime hours and other exogenous variables, the control variables have the expected signs.[4] The probability of layoff is negatively affected by tenure, working in the public sector, and increasing firm size in all the estimations, while there is a positive impact of a recent job change. Furthermore, the results show a negative effect of age and having a full-time partner for East German women who are at the same time more likely to be laid off if they have dependent children. In the estimations of the promotion probability, the coefficients on having children, having a full-time partner, work experience and holding a temporary job are mostly positive in all the estimations, while only West German women have a higher promotion probability if they work in a small firm. An increasing number of desired working hours leads to a higher probability of promotion except for the sub-sample of East German men, for whom this coefficient is significantly negative. Furthermore, the likelihood of promotion decreases with tenure, income, and when working in the public sector. The likelihood of a pay rise is positively influenced by the number of desired working hours, by having full-time working experience and with firm size, and it increases with tenure, age and education. There is a negative relationship between holding a temporary job and the probability of a wage increase. Furthermore, blue collar workers are less likely to get an increase in pay as well as married women.

Table 4 shows pooled and random effects Logit estimates of the likelihood of being laid off in the next year (t+1), within the next two years (t+2), and within the next three years (t+3). 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 estimations.

[4] The coefficients are not reported here, but are available from the author on request.

Table 4: Working Hours and Future Layoffs: Pooled Logit and Random Effects Logit Coefficients

	Pooled Logit			Random Effects			Pooled Logit			Random Effects		
	t+1	t+2	t+3	t+1	t+2	t+3	t+1	t+2	t+3	t+1	t+2	t+3
West Germany												
	Men						Women					
Overtime												
Unpaid	0.0214	0.0185	0.0041	0.0224	0.0698	0.2747	-0.0507	0.0509	-0.0035	-0.0507	2.3170	9.6274
Paid	-0.1225*	-0.0106	-0.0307	-0.1233	0.0343	-0.2702	0.0581	0.0527	0.0738	0.0581	0.4633	5.4803
Leisure	0.0315	0.0387	0.0263	0.0327	0.0934*	0.0775	-0.0534	0.0548	0.0502	-0.0534	2.7180	2.3796
Leis./paid	-0.1785*	-0.1139	-0.0548	-0.1784*	-0.1065	0.2857	-0.1892	-0.0061	-0.0040	-0.1892	-4.8459	2.7314
Contr. hours	0.0273	0.0363	0.0489	0.0278	0.0487	0.3732**	0.1028	-0.0067	-0.0116	0.1028	4.8572	1.5872
East Germany												
	Men						Women					
Overtime												
Unpaid	0.0800**	0.0448	0.0437	0.0853*	0.0614	0.3214	0.0080	-0.1142*	-0.0652	0.0080	-5.1142	-3.4782
Paid	-0.0383	-0.0242	-0.0234	-0.0417	-0.0817	0.0361	-0.0564	-0.0828	-0.0938	-0.0564	4.6348	5.4470
Leisure	-0.0493	-0.0037	0.0018	-0.0497	0.0037	0.0930	0.0198	-0.0546	-0.0891	0.0198	-2.9946	-1.6771
Leis./paid	-0.0134	-0.0179	-0.0248	-0.0138	-0.0393	0.1682	0.0544	-0.0775	-0.0455	0.0544	-4.0667	-4.9901
Contr. hours	0.0529	-0.0027	0.0309	0.0493	-0.0298	0.2270*	0.0610	0.1029	0.0732	0.0610	-4.8458	3.6714

Source: GSOEP, 1991-2002
Sample: German full-time employees, age 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 year dummies. *significant at the 5% level, **significant at the 1% level

Contrary to the expectations stated above, the unpaid overtime coefficient is positive for male workers in all estimations and hardly significant for most of the sub-samples. For female workers, unpaid overtime has a negative coefficient in some cases, and a statistically significant impact at the 5% level on the probability of layoff within the next two years in the estimations for East German women. In the estimations for male workers, the unpaid overtime coefficient is highly statistically significant, when estimating the probability of job loss in the following year, and it is robust in the random effects specification, which captures unobserved individual characteristics, as for example intrinsic differences in tastes to unpaid overtime work. In the estimations for West German male workers, paid and partially paid/partially leisure compensated overtime hours have a significantly negative impact on the job loss probability. The results suggest that unpaid extra hours do not prevent, but entail a layoff, and that other compensation forms of overtime work have more favorable consequences for workers who supply additional hours.

Table 5 presents Logit estimates of the likelihood of being promoted in the future with the amount of unpaid overtime hours as well as other working hours and control variables. In the estimation for males and East German females, the coefficient on unpaid overtime hours is positive. Furthermore, it is also statistically significant at the 5% level, when estimating the promotion probability within the next two years for East German women, while the effect is insignificant for all male workers. However, unpaid overtime is negative and statistically significant in the random effects estimation for West German women, when unobserved heterogeneity is controlled for. Hence, whereas for the sub-sample of East German women the estimates show the expected positive relationship between unpaid overtime and future promotion, the reverse is true for West German women. Other compensation forms of overtime seem to be important, which is especially true for West German male workers. The coefficients on leisure and partially paid/partially leisure compensated overtime have a much stronger and highly statistically significant positive impact on the probability of promotion.

The estimates of the probability of a pay rise of 20% are shown in table 6 for East and West German men and women. The unpaid overtime coefficient is positive with the exception of some estimates for East German workers, which are, however, not significant. In the sub-sample of West German women, unpaid overtime hours have a strong and highly statistically significant impact on the pay rise probability, which holds after controlling for unobserved worker heterogeneity in the random effects estimations. For East German women, the effect of unpaid overtime is only significant at the 5%, when estimating the pay rise within the following two years. There are no significant results of the unpaid overtime coefficient in the estimations for all male workers. However, male workers in East and West Germany have a higher probability of receiving a 20% higher wage within the next two years, when working paid overtime hours. In contrast, the pay rise probability is increased for female workers, when working partially paid/partially leisure compensated overtime.

Table 5: Working Hours and Future Promotion: Pooled Logit and Random Effects Logit Coefficients

	Pooled Logit			Random Effects			Pooled Logit			Random Effects		
	t+1	t+2	t+3	t+1	t+2	t+3	t+1	t+2	t+3	t+1	t+2	t+3
West Germany												
	Men						Women					
Overtime												
Unpaid	0.0008	-0.0043	0.0076	0.0011	-0.0082	0.0133	-0.1220	-0.0865	-0.0726	-0.1220	-0.5892*	-0.6803*
Paid	0.0070	0.0244	0.0654	0.0035	-0.0141	0.0810	-0.0377	-0.0305	-0.0710	-0.0377	-0.1208	-0.3070
Leisure	0.0659*	0.0449	0.0293	0.0693*	-0.0494	-0.2081	0.0871	-0.0744	0.2242	0.0871	-0.2561	0.6716**
Leis./paid	0.1047**	0.0934**	0.1002**	0.1133**	0.0818	0.0239	0.0395	0.0028	0.0733	0.0395	0.3129*	-0.2358
Contr. hours	0.0586	0.0598	0.0109	0.0525	0.1160	0.2011	-0.0579	-0.0174	-0.1414	-0.0579	-0.6641	-1.3771*
East Germany												
	Men						Women					
Overtime												
Unpaid	0.0958	0.0960	0.0335	0.0975	2.5476	-1.0084	0.0782	0.3210*	0.3577	0.0782	0.3203*	5.0725
Paid	-0.0387	0.0549	-0.0041	-0.0392	5.2720	-5.1765	-0.4145	0.1902	0.0614	-0.4145	0.1926	1.9376
Leisure	0.0201	0.1612*	0.0719	0.0184	3.0650	-9.7185	-0.0466	0.0961	0.3793**	-0.0466	0.0965	5.1393
Leis./paid	0.0704	0.1902	-0.1689	0.0715	9.0235	-2.1039	0.0957	0.0900	0.1901	0.0957	0.0901	2.2819
Contr. hours	-0.0553	-0.0375	-0.1234	-0.0584	-4.6707	-7.4319	-0.1848	0.0270	0.2255	-0.1848	0.0329	4.6793

Source: GSOEP, 1991-2002
Sample: German full-time employees, age 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 year dummies. *significant at the 5% level, **significant at the 1% level

Table 6: Working Hours and Future Pay Rise (20%): Pooled Logit and Random Effects Logit Coefficients

	Pooled Logit			Random Effects			Pooled Logit			Random Effects		
	t+1	t+2	t+3	t+1	t+2	t+3	t+1	t+2	t+3	t+1	t+2	t+3
West Germany												
	Men						Women					
Overtime												
Unpaid	0.0164	0.0417	0.0093	0.0467	0.0164	0.0105	0.1091*	0.2202**	0.0242	0.2476**	0.1091**	0.0250
Paid	0.0723**	0.0489	0.0310	0.0511	0.0723**	0.0261	0.1178	0.0162	0.0482	0.0038	0.1178*	0.0436
Leisure	0.0412	0.0291	-0.0142	0.0336	0.0412	-0.0194	-0.0322	0.0791	-0.0787	0.0879	-0.0322	-0.1015
Leis./paid	0.0379	0.0477	0.0209	0.0468	0.0379	0.0165	-0.0172	0.0957*	0.0553	0.1174*	-0.0172	0.0678
Contr. hours	-0.0574	-0.0002	-0.0317	0.0030	-0.0574*	-0.0411	0.0079	-0.0229	-0.0294	-0.0320	0.0079	-0.0438
East Germany												
	Men						Women					
Overtime												
Unpaid	0.0166	0.0234	-0.0220	0.0483	0.0166	-0.0188	0.0797	-0.0712	-0.0998	-0.0855	0.0797*	-0.1521
Paid	0.0139	0.0946**	0.0541	0.1068*	0.0139	0.0600	0.1187	0.1741*	0.1410	0.1682	0.1187	0.1139
Leisure	0.0279	-0.0190	-0.0271	-0.0248	0.0279	-0.0352	0.0423	-0.0216	-0.0691	-0.0272	0.0423	-0.0829
Leis./paid	0.0185	0.0610	0.0107	0.0762	0.0185	0.0220	0.0644	0.0326	-0.1682*	0.0462	0.0644	-0.4041
Contr. hours	-0.0359	-0.0820	-0.0554	-0.0797	-0.0359	-0.0795	-0.0699	-0.0457	0.1500	-0.0222	-0.0699	0.3250

Source: GSOEP, 1991-2002
Sample: German full-time employees, age 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 year dummies. *significant at the 5% level, **significant at the 1% level

6. Conclusion

The objective of our study is to analyze whether working hours can be interpreted as an investment. We raise the question as to what might lead workers to supply unpaid overtime hours, and what are the future consequences for these workers. Therefore, we investigate whether the supply of unpaid extra hours leads to higher future wages, to higher promotion probabilities and to a lower risk of losing the job. Using data from the GSOEP for the years 1991 to 2002 we estimate a pooled and a random effects Logit model for East and West German male and female full-time employed workers.

In our estimations we find that only for West German women unpaid overtime leads to positive wage effects, while the promotion probability is positively affected by unpaid overtime for East German women. Furthermore, unpaid overtime hours does not 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 in the estimations for East German men. At the same time the coefficients of the other forms of working hours are found to be equally important for the determination of the probability of future payoffs, as a positive impact of paid and with leisure compensated overtime hours is found for the probability of promotion and wage increase. In addition, the influence of other variables used as controls, eg. the amount of desired working hours, on future payoffs is found to be much greater. We conclude that there is only partial empirical evidence for a positive relationship between unpaid overtime work and future benefits. Working unpaid extra hours leads only to a slightly higher probability of promotion and pay rise and does not help to prevent a future layoff.

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Appendix

Table A1: Description and Descriptive Statistics of Variables Used in the Regression Model

Variable	Description	Mean (SD)	
	Dependent variables	Men	Women
LnWage	Log hourly compensation rate (gross earnings)	3.24 (0.48)	2.99 (0.44)
Promo	Promotion: 1= being promoted, else=0	0.09	0.10
Layoff	Layoff: 1= being laid off, else=0	0.02	0.02
	Overtime variable		
Unpaidovh	Unpaid overtime hours per week	0.79 (2.86)	0.53 (2.16)
	Socio-demographic variables		
Age	Age in years	40.18 (10.36)	38.05 (10.57)
Married	Marital status: 1 = married couple, else = 0	0.70	0,57
Partner	Partner is full-time employed: 1=yes, else=0	0.45	0.50
Child	Dependent children (up to 16 years old): 1= yes, no=0	0.45	0.30
	Education and work experience		
Edu	Length of education in years	12.23 (2.50)	12.22 (2.28)
Tenure	Work experience at the same employer in years (seniority)	10.44 (9.90)	8.14 (8.18)
Expfull	Previous work experience as full-time employee in years	18.43 (10.92)	14.39 (9.82)
Exppart	Previous work experience as part-time employee in years	0.34 (1.17)	1.73 (3.78)
	Job characteristics		
Public	Work in the public sector: 1=yes, else=0	0.15	0.33
Change	Change of job: 1=yes, else=0	0.14	0.16
Tempjob	Temporary job: 1=yes, else=0	0.04	0.06

Job0	No training necessary for the job: 1=yes, else=0;		
	Reference category	0.02	0.03
Job1	Briefing or courses necessary for the job: 1=yes, else=0	0.24	0.22
Job2	Vocational training necessary for the job: 1=yes, else=0	0.54	0.59
Job3	College/University necessary for the job: 1=yes, else=0	0.14	0.08
Occ0	Occupation: 1=all others, else=0; Reference category	0.01	0.03
Occ1	Occupation: 1=Managers, else=0	0.05	0.03
Occ2	Occupation: 1=Professionals, else=0	0.13	0.10
Occ3	Occupation: 1=Technicians, else=0	0.16	0.34
Occ4	Occupation: 1=Clerks, else=0	0.09	0.23
Occ5	Occupation: 1=Service/Sales, else=0	0.03	0.15
Occ6	Occupation: 1=Craft workers, else=0	0.33	0.05
Occ7	Occupation: 1=Plant/Machine, else=0	0.13	0.03
Occ8	Occupation: 1=Elementary, else=0	0.06	0.05
Bluecol	Blue collar worker=1, else=0	0.45	0.16
Bluecol0	Blue collar worker: 1=unskilled, else=0; Reference category	0.01	0.02
Bluecol1	Blue collar worker: 1=skilled, else=0	0.10	0.07
Bluecol2	Blue collar worker: 1=semiskilled, else=0	0.27	0.07
Bluecol3	Blue collar worker: 1=foreman, else=0	0.05	0.00
Bluecol4	Blue collar worker: 1=master, else=0	0.02	0.00
Whiteco0	White collar worker: 1=foreman, else=0; Reference category	0.02	0.00
Whiteco1	White collar worker: 1=without vocational training, else=0	0.02	0.05
Whiteco2	White collar worker: 1=with vocational training, else=0	0.03	0.14
Whiteco3	White collar worker: 1=qualified occupation, else=0	0.14	0.43
Whiteco4	White collar worker: 1=highly qualified occupation, else=0	0.18	0.11
Whiteco5	White collar worker: 1=executive function, else=0	0.02	0.01
	Industry (Reference category: all other branches)		
Branch1	Branch: 1=Energy/Water, else=0	0.01	0.00

Branch2	Branch: 1=Chemicals, else=0	0.01	0.02
Branch3	Branch: 1=Plastics, else=0	0.02	0.02
Branch4	Branch: 1=Stone, else=0	0.06	0.04
Branch5	Branch: 1=Metal, else=0	0.08	0.03
Branch6	Branch: 1=Wood, else=0	0.13	0.05
Branch7	Branch: 1=Textiles, else=0	0.02	0.01
Branch8	Branch: 1=Food, else=0	0.15	0.02
Branch9	Branch: 1=Construction, else=0	0.11	0.16
Branch10	Branch: 1=Wholesale/Retail, else=0	0.01	0.03
Branch11	Branch: 1=Transport, else=0	0.08	0.04
Branch12	Branch: 1=Banking/Insurance, else=0	0.04	0.07
Branch13	Branch: 1=Other services, else=0	0.03	0.18
Branch14	Branch: 1=Non-Profit, else=0	0.11	0.23
	Firm size		
Size1	Firm size < 5 employees	0.21	0.21
Size2	Firm size > 5 and <20 employees	0.06	0.07
Size3	Firm size > 20 and < 200 employees	0.03	0.03
Size4	Firm size > 200 and < 2000 employees	0.02	0.02
Size0	Firm size > 2000 employees; Reference category	0.12	0.12
U_State	Regional unemployment rate at the state level	9.01 (2.51)	16.36 (2.88)
U_District	Regional unemployment rate at the district level	9.51 (2.80)	17.24(2.79)

Source: GSOEP, 1991–2002 (own calculations)

Sample: German male and female full-time employees, age 20-65, civil servants and self-employed persons excluded

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