Discussion Paper No. 04-83

Is there a Wage Premium or Wage Discount for Flexible Hours?

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Non-technical summary

Flexible work time arrangements have become more and more popular over the past decades. While they allow firms to adjust quickly to demand fluctuations, employees may benefit in terms of more time sovereignty. Depending on the specific type of arrangement the corresponding wage effects are ambiguous and have not been analyzed in detail. According to the theory of compensating wage differentials, workers with more time sovereignty might be willing to forego earnings whereas employees who are supposed to adjust their working time by order of the employer have to be compensated by higher wages. We analyze the actual wage differentials due to flexible work time schedules with data from the GSOEP. The sample year 2002 includes information on whether the respondents' working hours are debited and credited to individual work time accounts (WTA) within the accounting systems of their employing firm. To control for selection on observable characteristics, we choose propensity score matching and compare wages of employees with and without WTAs. To take account of observed and unobserved sector-specific heterogeneity we apply a combined matching procedure consisting of a pre-matching on "working in the public sector" versus "working in the private sector", followed by a propensity score matching within these sectors. Additional variation in the treatment effect with respect to individual or firm-specific characteristics is analyzed by a second-step estimation using the wage differences between the matched pairs as dependent variable. Our results indicate that work time accountees receive higher wages on average. That is, the average treatment effect for the treated (ATT) is positive, for male as well as female workers, suggesting an employer's discretion to determine the timing of flexible work hours. However, remarkable differences exist on the sector and qualification levels.

Is there a wage premium or wage discount for flexible hours?

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Abstract

With flexible work time arrangements firms can quickly adjust to demand fluctuations, while employees may benefit from more time sovereignty. Depending on the specific type of arrangement the accompanying wage effects are ambiguous and have rarely been analyzed. According to the theory of compensating wage differentials, workers with more time sovereignty may be willing to forego earnings whereas others need to be compensated by higher earnings. We analyze the wage effects of work time accounts using GSOEP data from 2002. We compare wages of employees with and without work time accounts by propensity score matching. Our results indicate that work time accountees receive higher wages on average, thus suggesting an employer's discretion to determine the timing of flexible work hours, but with remarkable differences across sectors.

JEL classification: J30

Keywords: work time flexibility, propensity score matching, compensating wage differentials

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1 Introduction

Flexible work time arrangements have gained popularity in Germany over the past decades. The traditional form of work time flexibility such as discretionary flexibility in starting or finishing hours, often combined with a fixed window of compulsory presence hours, is still the predominant type of flextime. However, in many firms employees' working hours can now be shifted between weeks or even months. In Germany, more and more firms are implementing accounting systems – so-called work time accounts (WTA) – where employees' working hours are debited and credited to individual time accounts that have to be balanced within a specified period. The balancing period may thereby vary between a month and several decades in the case of lifetime accounts. The percentage of establishments providing WTAs and the percentage of the workforce covered by WTAs range between 30 and 70% in Germany, depending on methodology and scope of the respective survey (Seifert 2003).[1] Despite the growing importance of flextime arrangements, the financial consequences for employees have hardly been studied. In this paper, we will therefore assess the effect of a WTA on an employee's wage rate.

WTAs may evoke opposing effects on wages. Depending on the decrease or increase in time sovereignty by employees, the compensating wage differentials may be positive or negative. On one hand, flexible time schedules allow the firm to adjust quickly to demand fluctuations without paying an overtime premium. Empirical evidence for Germany suggests that this is the main reason to adopt flexible working hours (DIHT 2000, Klenner 1997). According to the theory of compensating wage differentials, substantial and long-lived changes in job characteristics should be observed to affect wages (Rosen 1986). As a result, employees may ask for financial compensation for the increased uncertainty regarding the timing and duration of their working time. Hence, shifting the employer's risk on to the staff is then expected to result in higher average wage rates (see e.g. Gariety and Shaffer 2001). In some cases, flexible work time arrangements might involve an implicit agreement to provide work at abnormal times of the day, which also works towards a positive compensation.

On the other hand, employees may benefit from innovative work time arrangements in terms of more time sovereignty. In general, work councils succeed in enforcing some kind of time

sovereignty for their staff, sometimes as an exchange for the foregone overtime benefits.[2] Hence, if workers' marginal utility of leisure varies over the day, week or year, the timing of the actual work schedule might have decisive effects on work satisfaction. Provided that a flexible work time schedule better matches the individual preferences of an employee or that he or she relies on a flexible work time arrangement – be it due to family responsibilities, commuting or other personal reasons – he or she might be willing to accept a lower wage rate compared to a job with fixed working times. However, if flexible work hours reduce one's time sovereignty because they are mainly determined by the firm, positive compensating wage differentials become likely (Bell and Hart 2003).

Flexible working hours, as a means to adjust labor input, may furthermore be interpreted as a mutual insurance between employer and employee (Carstensen 2000). The argument is that workers gain job security, since the use of WTAs or other types of flexible work schedules makes dismissals more unlikely. As an insurance benefit, workers are supposed to accept lower wages, for example by renouncing overtime premiums in boom times, or the willingness to share in the employer's risk as discussed above. Apart from that, flexible time schedules might effect absenteeism and individual productivity (see e.g. Ralston, Anthony and Gustafson 1985, McGuire and Liro 1986, Dalton and Mesch 1990 or Shepard, Clifton and Kruse 1996).

Which of these diverse effects is predominant is not clear from a theoretical perspective. In practice, the resulting wage effects depend on employees' preferences and how employers or employees decide on when and how much has to be worked. Whereas workers with high preferences for job security or time sovereignty might be willing to forego earnings in order to benefit from WTAs, accountees who are supposed to adjust their working time by order of the employer, have to be paid higher wages.

The goal of this paper is to identify empirically the wage premium or discount for work time flexibility, namely WTAs. We choose propensity score (PS) matching and compare wages of

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[1] Seifert (2003) draws on company surveys by Bellmann and Ludewig (2000) and DIHT (2000), staff surveys by Bundesmann-Jansen et al. (2000) and Statistisches Bundesamt (2002) and work council surveys by Seifert (2001).

[2] According to the survey conducted by the German Chamber of Commerce and Industry, 31% of the "flexible" firms report that motivation played a decisive role for the adoption of flexible working hours. This observation suggests that a considerable part of employees were able to extend their time sovereignty. Among firms in the service sector and companies with more than 1000 employees this holds true for even 50% (DIHT 2000).

employees with and without WTAs, conditional on their likelihood of having an account and thereby controlling for selection on observable characteristics. Referring to the literature on differences between employees in the public and private sector, we argue that the sector choice is a good indicator for an individual's preferences towards specific workplace characteristics, such as safety, earnings level and flexibility, and may take up part of the selection process based on unobservables.[3] For this reason, we apply a combined matching procedure, consisting of a pre-matching on "working in the public sector", followed by a PS matching within sectors to accommodate differences between the private and public sector. This procedure allows us to take into account observed and unobserved sector-specific heterogeneity. Additional variation in the treatment effect with respect to individual or firm-specific characteristics is analyzed by a second-step estimation using the wage differences between the matched pairs as dependent variable.

Our results indicate that work time accountees receive higher wages on average than would be the case if their hours were not debited or credited. That is, the average treatment effects on the treated (ATT) are positive, for male as well as female workers. However, remarkable differences exist on the sector and qualification level.

The outline of the paper is as follows: Section 2 provides a brief description of the evaluation approach and Section 3 of the data. The wage effects for female and male employees are presented and interpreted in Section 4. Section 5 concludes.

2 The evaluation approach

In this section, we briefly present our econometric approach to determine the wage effects of WTAs. Our research question may be interpreted as a classical evaluation problem, since we can only observe persons that either have or do not have a WTA, but never both at the same

[3] There exists comprehensive evidence that public and private sector jobs do not only differ with regard to wages (see e.g. Dustmann and van Soest 1998) and the pension system, but also in several other ways, such as hiring and advancement opportunities, job security and skill requirements (see e.g. Blank 1985). Bellante and Link (1981), for instance, show that measured risk aversion among workers is significantly correlated with sector choice. Those with poor health, and those who are more risk averse, should thus be more likely to seek employment in the less economically pressured sector. Nielsen, Simonsen and Verner (2003) point out that a job in the public sector is more likely to provide family-friendly working conditions. Hence, individuals – especially women who expect to have children – may prefer to work in the public sector in order to benefit from family friendly policy measures and to avoid huge wage penalties due to child-related employment breaks.

time. Solving this problem requires credible estimates of the counterfactual outcomes that would have been realised, had persons been differently assigned to WTAs.

Let Y_1 denote the wage rate of individuals with a WTA and Y_0 the wage rate of those without. The difference between both potential outcomes (Y_{0i} and Y_{1i}) for a given person represents the financial impact of the WTA. In formal terms, the impact Δ_i for person *i* is given by:

$$\Delta_i = Y_{1i} - Y_{0i}.$$

It is, however, unlikely that all individuals are equally affected by the use of WTAs. For one thing, it may be the case that those employees whose productivity is expected to gain most from flexible work schedules are more likely to be offered a WTA. Furthermore, individuals who are able to negotiate higher compensations for uncertain working hours may have more incentives to opt for a WTA. As a result, the impact of WTAs will more likely be positive and larger for account users compared to employees who still work under traditional work time arrangements. In our analysis, we therefore focus on the impact of WTAs on wages of employees who actually use an account, that is, the average effect of treatment on the treated (ATT):

$$ATT \equiv E\left(Y_{1i} \middle| D_i = 1\right) - E\left(Y_{0i} \middle| D_i = 1\right)$$

where D_i is an indicator variable which equals one if person i has a WTA and equals zero otherwise.

The average treatment effect (ATE), on the contrary, measures the wage gain or loss for an average worker, unconditional on having an account or not. By comparing both effects we will be able to deduce information on the selection process into WTAs.

2.1 Matching to control for selection on observables

A simplistic approach to estimate the wage effect of WTAs would be to compare the wage rates of accountees and non-accountees. This would be a valid approach if accountees formed a randomly selected subgroup of all employees. However, the effect will be underestimated if, for instance, firms doing particularly badly are more likely to offer WTAs. In contrast, if WTAs are primarily offered to employees with more favourable labour market characteristics, a positive effect will overestimate the true wage differential. Thus, a selection bias may emerge if the use of WTAs is related to the wage rate.

To account for this possible selection effect, we apply the method of matching, which explains the selection purely in terms of observable characteristics (Rubin 1974).[4] Every person in the treatment group (the accountees) is matched to a comparable individual from the non-treated group (non-accountees), who is determined by observable characteristics. The mean effect of treatment is then the average difference in wage rates between matched accountees and non-accountees.

The approach rests on an identifying assumption which is known as the Conditional Mean Independence Assumption (CMIA) (Rosenbaum and Rubin 1983). According to this, Y_0 is the same for treated and untreated individuals in expectation, if we control for differences in observable characteristics.

$$E\left(Y_o \middle| D=1, X\right) = E\left(Y_o \middle| D=0, X\right)$$

Now we can infer the counterfactual wage rate for the accountees. Any differences between treated and non-treated individuals are attributed to the effect of WTAs. In the present study, we assume that selection into a job with a WTA is taken up by our set of firm and individual characteristics. We argue that the introduction of WTAs in a firm is at the discretion of the employer rather than the individual employee. However, to account for individual preferences towards certain job characteristics, among which also work time flexibility, we only allow matches within the public respectively private sector.

It is also assumed that for all values of *X* there is a positive probability of either participating *(D=1)* or not participating *(D=0)*, i.e [5]

$$0 < \Pr(D=1 \middle| X) < 1 \quad \text{and} \quad 0 < \Pr(D=0 \middle| X) < 1$$

This implies the existence of an additional variable – not included in *X* and observable or not – which effects the probability of using a WTA. Such a random variation could come from preferences towards leisure activities.

4 We cannot preclude bias if unobservables have a non-random impact on the two processes as well. However, a judicious use of observable characteristics helps to minimise the bias.

5 Since our parameter of interest is the ATT, the condition 0 < Pr(D=1|X) is not required, because that condition guarantees that the probability of using a WTA of a non-accountee equals the probability of an accountee.

2.2 Matching algorithms

In practice, the chances to find an exact match conditional on specified characteristics diminish with the number of relevant individual characteristics (curse of dimensionality). We overcome this obstacle by applying propensity score (PS) matching: Participants and non-participants are matched based on their estimated probability to belong to the treatment group (*P(X)*).[6]

The first step in selecting comparable individuals is to estimate a participation model and derive the PS of being treated. The variables used in the model should influence both, having a WTA and the wage rate as the outcome variable. In the next step, non-accountees are matched to accountees based on their PS = *P(X)*. To select appropriate controls we apply the nearest neighbour matching (NNM) with replacement, where for each accountee that one non-accountee with the closest *P(X)* is selected. Since a non-treated individual may be matched to more than one treated individual, the probability of finding a more or less comparable counterpart among all possible control observations is higher compared to a method without replacement.[7]

3 Data

The data used for the analysis is drawn from the German Socio-Economic Panel (GSOEP) The GSOEP is a yearly microdata panel which has been conducted in annual interviews of individuals and households since 1984 in West Germany and since 1990 in East Germany. In 2002, information on the existence of WTAs has been included in the questionnaire for the first time. For this reason, our analysis is based on cross-section data from this year. The 2002-sample of West and East Germany comprises 13,000 households and 23,000 respondents in total.

We restrict our sample to observations with reliable information on their market wage, hence, we drop all self-employed, unemployed, students, individuals in special training programs or national services (military and civil) as well as people with disabilities (of more than 50 percent on the official disability scale). Elderly workers on special part-time

[6] Rosenbaum and Rubin (1983) show that matching on *P(X)* produces consistent estimates of the treatment effect.

[7] A detailed discussion about the advantages and disadvantages of different PS matching algorithms can be found in Dehejia and Wahba (1998) and Imbens (2004).

retirement schemes are also excluded from the sample. Our data contain people aged between 20 and 60 years, leading to observations from 4,448 males and 3,883 females who provide reliable information on monthly gross earnings and contractual respective actual working hours.

As hourly wage rates are not observed directly, we construct this variable by dividing current monthly gross earnings by the number of working hours. Since deviations from contractual working hours are supposed to be settled within a certain time period, we use the stipulated total number of contractual weekly hours (multiplied by 4.3) for individuals with WTAs and employees of the control group whose overtime hours are compensated by time-off (but do not have a WTA). However, in the case that overtime hours are not compensated with time-off, actual weekly working hours are used to calculate the hourly wage rate (see Figure 1). Since the definition of the dependent variable may have crucial effects on the estimation results, we test different definitions of the hourly wage rate.[8] The results hardly depend on the measure of working hours. Hence, we present estimation results only for the definition of weekly working hours described in Figure 1. The information on the existence of a WTA is captured in a dummy variable that takes the value one if the individual answers affirmatively. Otherwise it is set to zero.[9]

Figure 1: Definition of weekly working hours

hours =	Contract weekly hours	if person $\in$ {treatment group}
	Contract weekly hours	if person $\in$ {control group} and overtime hours are compensated with time-off
	Actual weekly hours	if person $\in$ {control group} and overtime hours are not compensated with time off

[8] We test two alternatives. First, we use contractual working hours for all individuals (assuming that even in the case of uncompensated overtime hours, contractual hours represent the better measure, because actual hours may vary a lot from one month to the other). Second, we use contractual hours if overtime hours are compensated by time-off and actual hours if not. This definition would be appropriate if WTAs were not flexible enough to absorb all fluctuations in weekly working hours, such that part of the accumulated overtime hours are paid or expire.

[9] The question on work time accounts follows a so called filter question: only employees who report to eventually work overtime hours are directed to this question. Hence, the dummy variable “work time account” is set to zero for all individuals who do not report overtime.

4 Empirical results

4.1 Propensity Score Estimation

The PS is estimated in a standard probit model, where variables influencing both the propensity to hold a WTA as well as the wage level are incorporated. Economic and social theories provide guidance in choosing the relevant variables. We distinguish between four sets of variables: [10]

- *Personal characteristics* such as age, marital status and information on children,
- *Human capital characteristics* such as qualification level, work experience, job status and tenure
- *Job or firm characteristics* such as occupation, industry and public/private sector information, firm size
- *Employment status* such as working full-time, part-time or marginal working hours

A descending specification search based on LR-tests is applied in order to obtain a final set of explanatory variables which yields stable predictions of the PSs. As most of the estimated coefficients have the expected signs and sizes, we will comment on selected coefficients only (the estimation results for women and men are presented in Table A1 in the Appendix).

In general, personal characteristics prove to be rather weak predictors for the likelihood of having a WTA. Human capital variables, on the contrary, seem to be more important in determining the use of WTAs. Three results are worth mentioning. First, there are regional differences. East German men and women have a significantly higher probability of using an account than their West German colleagues. One reason may be that East German firms are younger on average and hence less restricted by well established organisational structures and employer-employee relationships. Second, even if flexible working hours are often praised as a family friendly work practice, the existence of one or more children aged up to 3 years reveals a negative effect for females and no effect for males. Third, the negative signs of the university degree coefficients seem awkward at first glance but they may reflect the nature of high-skill jobs where employees are expected to work overtime hours without compensation.

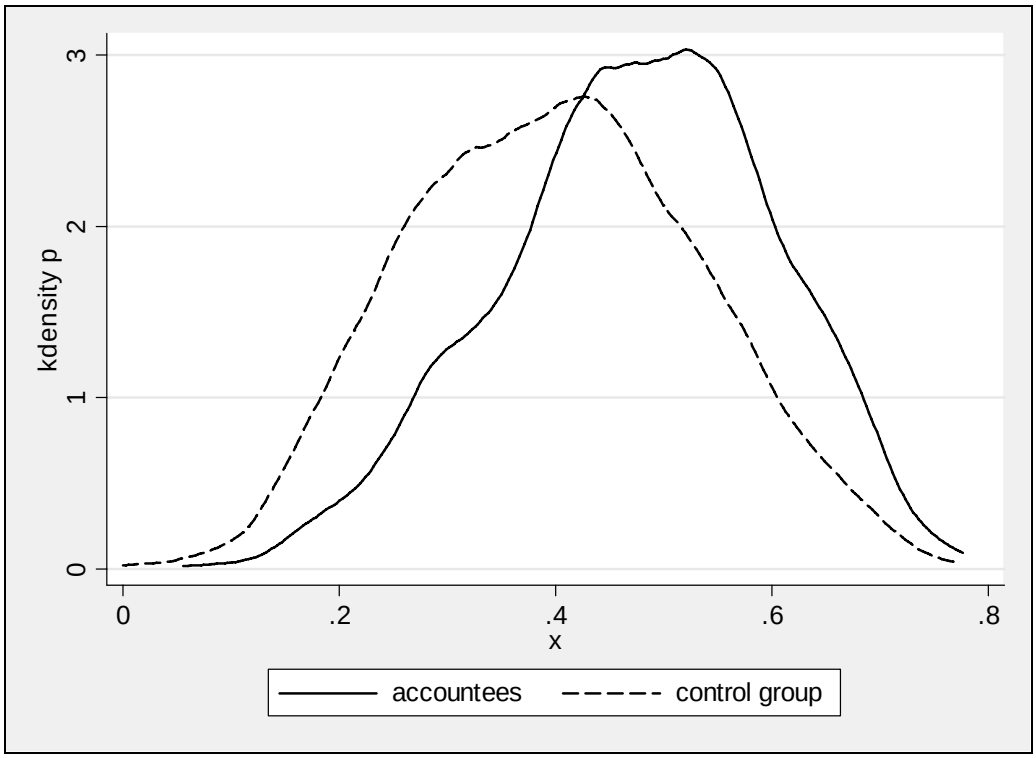
[10] More information on the firm side or the process of implementing WTAs would be appreciated but is not available together with the workers' characteristics in any data set we know of. In this sense, the GSOEP data provides the most affluent description of variables related to the existence of a WTA at an individual work place.

The results with respect to the job-related variables indicate that access to a WTA depends on the occupational status as well as on the sector affiliation. From a theoretical point of view it is not unambiguous which sector has a lower or higher likelihood for WTAs. On one hand the employer-employee relationship may be more consensus-oriented in the public sector. Hence, if workers value flexible work hours, accounts will more likely be offered in the public sector. On the other hand, competitive pressure may be greater in the private sector. Hence, if productivity increases with flexibility, private employers will be more likely to introduce accounts. The results display a higher probability for WTAs in the private sector for males whereas for females public sector employment has a positive but not statistically significant coefficient. However, the effect for females may be imbibed by the industry variables, especially by the categories "education, health, law, church" and "public administration".

Several studies stress the importance of firm size in the context of flexible work time. For example Ludewig (2001) argues that introducing WTAs involves high fixed costs and low marginal costs. If this is the case, WTAs will be relatively more favorable for large firms, since fixed costs per employee are decreasing with the number of employees. Our results are in accordance with these deliberations.

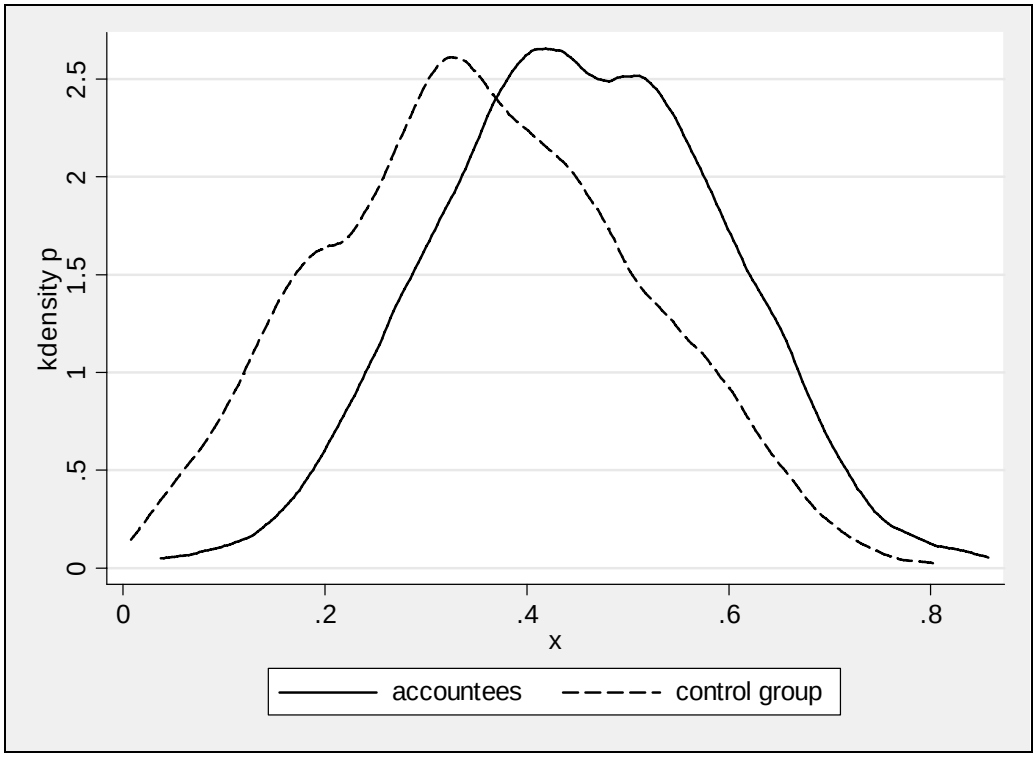
Given the coefficient estimates, we predict the PS for all those individuals in the sample for whom wage information is available. To check whether the density functions provide common support, we illustrate the predicted PSs for the samples of accountees and the potential control persons, in separate figures for males (Figure 2a) and females (Figure 2b).

Figure 2a: Kernel density functions of the PSs for all male accountees and potential control persons



Source: Own calculations based on the GSOEP 2002.

Figure 2b: Kernel density functions of the PSs for all female accountees and potential control persons



Source: Own calculations based on the GSOEP 2002.

The density functions seem to provide common support, although we have difficulties finding control persons with exactly the same characteristics for females at the far right of the score scale. Nevertheless, matches can be found for all accountees even for those at the margins of the PS distribution.

4.2 Matching Results

The selection of an adequate control person for each treated individual is based on the predicted PSs. This procedure controls for selection on observable characteristics. Apart from that, differences between the private and public sector are accommodated by applying a within-sector matching approach. Hence, we first do an exact matching on the sector (public or private) followed by a PS matching within sectors. This procedure allows us to also account for unobserved sector-specific heterogeneity. As a result, wage differentials due to specific job characteristics in the public versus private sector can be disentangled from the financial effects resulting directly from WTAs.

In the first two columns of Table A2 and A3 in the Appendix, the means of all variables included in the PS estimation are given separately for the accountees and all potential control men and women. The third columns provide variable means of the selected control group. As one can see, the average values of the control groups resemble the samples of WTA users more than the respective control reservoirs do. The difference between the treated and the (potential) control persons can be described by the standardized difference in percent, which was first introduced by Rosenbaum and Rubin (1985). The standardized difference represents the mean difference as a percentage of the average deviation:

$$bias = 100 * \frac{\bar{X}_k^{treated} - \bar{X}_k^{control}}{\sqrt{\frac{\sigma_k^{treated} - \sigma_k^{control}}{2}}}$$

where $\bar{X}_k^{treated}$ and $\bar{X}_k^{control}$ denote the sample means of each covariate in the treated group and the control reservoir (column 2), respectively the actual control group (column 3). $\sigma_k^{treated}$ and $\sigma_k^{control}$ denote the corresponding sample variances. Comparing the last two columns of Table A2 and A3 indicate that the difference between employees using WTAs reduces remarkably after applying within-sector propensity matching. We therefore conclude that our matching algorithm successfully reduces the difference with respect to observable characteristics. The results of the match procedure are presented in Table 2.

Table 2: Wage differentials after the matching procedure with pre-matching on the sector

	Males (#4448)			Females (#3883)		
	Accountees (#1954)	Controls (#2494)	Difference	Accountees (#1575)	Controls (#2308)	Difference
Log Wage	2.783	2.743	0.041	2.568	2.435	0.134
ATT	2.783	2.681	0.103	2.568	2.505	0.063
ATE			0.083			0.048

Source: Own calculations based on the GSOEP 2002.

The wages of male accountees in the before-matching sample are on average 4 percent higher than the wages of men without a working time account. After controlling for differences in observed characteristics the wage differential increases to statistically significant 10.3 percent[11]. This means that a randomly chosen man from the sample of accountees earns 10.3 percent more than if he had no WTA. This result indicates that low-wage men with lower paid personal and job characteristics are more likely to have a WTA. The average treatment effect (ATE) is also positive and of almost same size as the ATT. Hence, a randomly drawn man from the total sample would earn an 8.3 percent higher wage if he had a WTA.

For female employees, the results are somewhat different. Without controlling for differences in observed covariates, women with an account earn 13.4 percent higher wages on average. As the ATT of 6.3 percent in Table 2 tells us, this wage differential diminishes after balancing the samples with respect to observable characteristics[12]. Unlike men, women with higher paid characteristics are more likely to work in firms with accounts. Furthermore, it is interesting to note that, as for men, the ATE is lower than the ATT.[13] The difference between ATT and ATE provides some information about the selection in WTA: female and male employees with an account get higher compensation for their flexible work time than those without an account.

The positive ATTs for males and females indicate that work time accountees do not earn higher wages due to differences in observed and unobserved characteristics (as long as they

[11] Bootstrapping with 200 replications yields a standard error of 0.019.

[12] Bootstrapping with 200 replications yields a standard error of 0.058.

[13] As a sensitivity analysis, we also applied an OLS specification. We regressed the logarithm of the gross wage rate on all variables entering the propensity score estimation. In this setting, male accountees earn 8 percent more than their colleagues with fixed working hours and female accountees obtain a wage premium of 6 percent. Hence, the ATE and OLS results do not differ qualitatively.

are correlated with the sector choice). We interpreted the wage surplus as a compensating wage differential for flexible work hours. This result leads one to suppose that overall the use of WTAs is more likely to be driven by employer's request than by demand for more time sovereignty by the employees (see also Klenner 1997 and Eberling et al. 2004).

4.3 Heterogeneous Wage Effects

So far, the results of the matching approach describe the average wage surplus of employees using WTAs. According to the theory of compensating wage differentials, this observed premium suggests that WTAs are particularly used to shift working hours according to operational requirements of the firm rather than to provide better reconciliation of work and family life or to reduce the unemployment risk on the worker's side. However, the handling of WTAs might differ across firms or employees. It might seem conceivable that individuals with higher bargaining power, e.g. high-skilled workers or employees with long tenure, may receive higher compensations for sometimes "inconvenient" working hours than less demanded or organised employees. Furthermore, the surplus might depend upon the specification of the WTA. Work time arrangements that allow longer time periods to balance may cause higher wage compensations than traditional flextime models where overtime hours have to be settled within one month, because long settlement periods bear the risk of never being compensated for and hence the loss in time sovereignty tends to be more important for these employees.

In a next step, we will exploit the heterogeneity of the treatment effects by conditioning the ATT on a set of worker and firm-specific characteristics, including qualification levels, region, sector and firm size dummies as well as tenure. We apply a regression analysis where the dependent variable is the difference in wages between each treated and its control person. Since we expect the wage premium to increase with the length of the settling period, we regress on two dummy variables denoting the period of time in which the account has to be settled. The variable *long settlement* captures the effect of WTAs with settlement periods of more than one year and *short settlement* is equal to one if the period is less than one year. Firms whose accounts have to be settled within one year belong to the reference group.

The OLS estimation results are presented in Table 3. As one can see, for males there are no significant differences between the various settling periods. For females, however, short settlement periods (< one year) lead to significantly smaller compensations. The other coefficients draw a more plausible and uniform picture. Employees in the public sector get smaller premia for WTAs than those in the private sector. This can be explained by different

motives to implement work time arrangements in the private or public sector. In the public sector, WTAs serve to improve the work conditions of employees rather than to balance demand fluctuations. As a result, employees are relatively free to decide when to start and end their work days. In the private sector, time accounts are often used to record ordered overtime hours without having to pay overtime premia. These overtime accounts are still dominant in most industry sectors (Seifert 2003). Consequently, employees with WTAs in the public sector tend to enjoy more time sovereignty than accountees in the private sector and, hence, get smaller, if any, compensation.

The results further show that the compensation increases with the size of the firm. This observation may be due to the fact that in larger firms negotiations about WTAs involve work councils who often have more bargaining power than non-organised employees in smaller firms. We also identify a statistically significant relationship between the wage premia paid for WTAs and the qualification level of employees. Male employees with a vocational college degree or university diploma are compensated to a much higher degree. In contrast, male employees without any vocational training get almost the same compensation as those with completed apprenticeship training. For women, a positive coefficient can only be observed for employees with university degree. However, women without completed apprenticeship training receive a significantly lower compensation for the use of flexible working hours. It may be argued that for low or medium qualified employees the positive effect of WTAs due to the reduced unemployment risk seems to over-compensate the potential loss of time sovereignty. As a result, they might be willing to forego wage surcharge. Since high qualified employees have better employment chances on average and employers are more interested to bind these employees to the firm, their compensation for flexible and sometimes inconvenient working hours is likely to be higher.

Our results seem to indicate that the job stabilizing effect of WTAs is more important in East Germany: employees of East German firms are willing to accept a lower compensation than those in West Germany. Tenure, finally, is positively related to a mark-up on having a WTA. This holds true for male as well as female workers. The reason might be larger bargaining power of more senior employees.

Table 3: ATT conditional on selected characteristics

	Males		Females	
	Coefficient	Std. Error	Coefficient	Std. Error
Short settlement	-0.031	0.031	-0,024	0,034
Long settlement	0.003	0.029	-0,016	0,034
Public sector	-0.170	0.029	-0,099	0,030
20 – under 200 employees	0.186	0.041	0,132	0,041
200 – under 2000 employees	0.316	0.042	0,148	0,042
2000 and more employees	0.348	0.041	0,164	0,044
Vocational training not completed	0.005	0.055	-0,188	0,059
Vocational college degree	0.149	0.031	-0,012	0,035
University diploma	0.353	0.032	0,259	0,038
East Germany	-0.290	0.030	-0,212	0,032
Tenure	0.008	0.001	0,013	0,002
No. of observations		1,929		1,545
Adj R-squared		0.2002		0.1091

Source: Own calculations based on the matched sample of individuals with and without WTAs from GSOEP 2002.

5 Discussion and Conclusion

The aim of this paper is to assess the wage effect of flexible work time schedules, particularly work time accounts. While proponents of flexible work hours praise the increasing flexibility for both the firm and the employees, a rising number of studies shows that more flexibility for one side, e.g. quick adjustment to seasonal demand fluctuations, may cause a burden for the other, e.g. reduced time sovereignty. According to the theory of compensating wage differentials, variation in individual work conditions – such as time sovereignty or job security – should show up in wage premia or discounts respectively. To identify the net effect, we therefore determine the wage differential between employees with and without flexible work hours.

With traditional PS matching we can show that the average treatment effect for the treated amounts to about 10 percent for male and 6 percent for female employees. Without controlling for differences in observed covariates this differential is smaller for men whereas it more than doubles for women, thus indicating a gender-specific selection into jobs with WTAs. Whereas low income men with lower paid personal and job characteristics are more likely to have a WTA, the opposite is true for women. We then exploit the heterogeneity of the treatment effects by conditioning the ATT on a set of worker and firm-specific

characteristics. The results indicate that variations in the wage effects of WTAs are related to public versus private sector affiliation, firm size, region and human capital variables such as education level and tenure.

It has to be noted, that the observed wage differential between jobs with a WTA and those without may not solely be explained by differences in working conditions. Empirical evidence shows that flexible hours may also have positive effects on work attendance, turnover or employees' working morale (see e.g. Allen, 1981, McGuire and Liro 1986 or Dalton and Mesch 1990). As a result, flextime firms seem to operate more productively as well as more efficiently (see e.g. Kim & Campagna 1981, Shepard, Clifton and Kruse 1996 or Wolf and Beblo 2004). Given that the number of firms using flexible work time schedules is on the rise, employers may be forced to share in the marginal returns to WTAs with their employees, because more outside options are available. Hence, part of the wage premium for flexible work schedules might be attributed to the positive productivity effect.

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Appendix

Table A1: Probit estimation results of the likelihood of a WTA

	Men		Women	
Variable	Coeff.	Std. Error	Coeff.	Std. Error
Personal characteristics				
Age	-0.0296	0.0090	-0.0071	0.0115
Children < 3 years	---	---	-0.8453	0.2609
East Germany	0.2051	0.0450	0.1086	0.0488
Partner information				
Partner with a full-time (ft) job	---	---	-0.1010	0.0466
Partner with a part-time (pt) job	---	---	0.3164	0.1653
Partner with a marginal job	---	---	-0.9311	0.3210
Human capital				
Qualification (ref:apprenticeship)				
No vocational training	-0.2604	0.0742	-0.0880	0.0769
Vocational college degree	0.0667	0.0499	0.1638	0.0513
University diploma	-0.1377	0.0597	-0.0430	0.0640
Work experience				
Experience in full-time employment	0.0224	0.0055	-0.0027	0.0065
Experience in ft employment^2	-0.0005	0.0002	0.0000	0.0002
Experience in part-time employment	0.0578	0.0381	0.0193	0.0102
Experience in pt employment^2	-0.0061	0.0045	-0.0009	0.0005
Interaction terms				
Age * experience in ft employment	0.0178	0.0085	-0.0020	0.0117
Age * experience in pt employment	0.0146	0.0090	0.0049	0.0120
Job characteristics				
Occupational status				
Trained and untrained workers	-0.0422	0.0734	-0.4546	0.0605
Skilled blue collar workers	0.2438	0.0653	-0.1615	0.0953
Foreman and master craftsman	0.1503	0.1157	-0.6345	0.3571
White collar w/ low qualification	0.1998	0.0620		
White collar w/ high qualification			-0.0756	0.0668
Civil servants of a lower and middle level status	0.2002	0.1210	-0.0913	0.1434
Civil servants of an upper and executive level status	0.0881	0.0910	-0.4667	0.1002

.... Table A1 continued

Sector (ref: private sector)				
Public sector	0.2084	0.0682	0.0629	0.0595
Public * pt employment	---	---	0.1926	0.0911
Public * age	---	---	-0.0103	0.0043
Firm size (ref: < 20 employees)				
20 – under 200 employees	0.1203	0.0559	0.1949	0.0533
200 – under 2000 employees	0.3521	0.0603	0.4760	0.0604
2000 and more employees	0.4385	0.0609	0.2932	0.0623
Work hour status(ref: full-time empl.)				
Part-time employment	---	---	-0.4009	0.1976
Marginal employment	---	---	-0.8420	0.4808
No. of observations		5,207		4,713
R^2		0.0587		0.0896

Note: The results for the industry variables are omitted but are available on request. The probit estimation sample includes more observations than the matching sample due to missing values on the hourly wage rate.

Source: Own calculations based on the GSOEP 2002.

Table A2: Descriptive statistics of the variables in the probit estimation for men

	Mean of account holders (1)	Mean of non-account holders (2)	Mean of Controls (3)	% bias between (1) and (2)	% bias between (1) and (3)
Age	40.673	42.340	41.143	-17.374	-5.02
East Germany	0.244	0.201	0.252	10.406	-1.78
No vocational training	0.056	0.095	0.064	-14.901	-3.66
Vocational training	0.502	0.447	0.469	10.942	6.76
Vocational college degree	0.248	0.193	0.283	13.257	-8.12
University diploma	0.235	0.318	0.227	-18.441	2.06
Experience in ft employment	15.737	15.356	16.256	3.469	-4.92
Experience in pt employment	0.227	0.286	0.220	-5.540	0.76
Trained and untrained workers	0.114	0.155	0.107	-12.205	2.12
Skilled blue collar workers	0.298	0.232	0.313	15.131	-3.11
Foreman and master craftsman	0.033	0.027	0.042	3.463	-5.11
White collar w/ low qualification	0.204	0.173	0.203	7.901	0.25
White collar w/ high qualification	0.227	0.308	0.205	-18.339	5.35
Civil servants of a lower and middle level status	0.051	0.024	0.066	14.312	-6.35
Civil servants of an upper and executive level status	0.073	0.081	0.064	-3.271	3.45
Public sector	0.280	0.231	0.280	11.343	0
Under 20 employees	0.145	0.204	0.153	-15.613	-2.27
20 – under 200 employees	0.251	0.327	0.259	-16.796	-1.64
200 – under 2000 employees	0.269	0.231	0.238	8.816	7.06
2000 and more employees	0.335	0.237	0.350	21.658	-3.24
No. of observations	1,954	2,494	1,954		
No. of individuals	1,954	2,494	1,076		

Note: The results for the industry variables and interactions terms are omitted but are available on request. The number of observation in column (2) is lower than that of the gross sample of non-accountees due to missing values.

Source: Own calculations based on the GSOEP 2002.

Table A3: Descriptive statistics of the variables in the probit estimation for women

	Mean of account holders (1)	Mean of non-account holders (2)	Mean of Controls (3)	% bias between (1) and (2)	% bias between (1) and (3)
Age	39.595	41.605	39.674	-20.79	-0.44
Kids aged under 3 years	0.003	0.010	0.001	-8.41	-7.38
East Germany	0.277	0.238	0.304	8.82	-4.77
Part-time employment	0.356	0.400	0.339	-9.11	4.81
Marginal employment	0.013	0.060	0.010	-24.94	2.33
Partner in ft employment	0.603	0.634	0.649	-6.54	-0.13
Partner in pt employment	0.018	0.014	0.017	3.61	-4.77
Partner in marginal employment	0.002	0.007	0.002	-8.04	1.59
Vocational training not completed	0.068	0.116	0.077	-16.72	2.05
Vocational training	0.438	0.442	0.417	-0.86	0.90
Vocational college degree	0.294	0.212	0.303	18.97	1.12
University diploma	0.220	0.242	0.222	-5.09	-3.18
Experience in ft employment	9.848	10.387	10.071	-5.74	-0.16
Experience in pt employment	2.879	3.455	2.906	-11.16	1.33
Trained and untrained workers	0.114	0.239	0.113	-33.27	3.27
Skilled blue collar workers	0.045	0.045	0.043	0.01	-2.96
Foreman and master craftsman	0.002	0.003	0.001	-2.27	-2.52
White collar w/ low qualification	0.615	0.487	0.640	25.77	-1.57
White collar w/ high qualification	0.144	0.127	0.142	5.02	-1.44
Civil servants of a lower and middle level status	0.025	0.015	0.012	7.26	4.77
Civil servants of an upper and executive level status	0.050	0.079	0.046	-11.99	4.28
Public sector	0.409	0.342	0.409	13.87	0
Under 20 employees	0.204	0.326	0.191	-27.91	-20.61
20 – under 200 employees	0.282	0.311	0.286	-6.39	-2.94
200 – under 2000 employees	0.277	0.174	0.273	24.89	-2.82
2000 and more employees	0.237	0.188	0.249	11.83	6.87
No. observation	1,575	2,308	1,575		
No. individuals	1,575	2,308	917		

Note: The results for the industry variables and interaction terms are omitted but are available on request. The number of observations in column (2) is lower than that of the gross sample of non-accountees due to missing values.

Source: Own calculations based on the GSOEP 2002.