The effects of works councils on overtime hours - a censored quantile regression approach

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November 2012

Abstract

This study analyzes the impact of German codetermination rights on overtime hours. Using German personal data, our results show that the effects of works councils strongly depend on the contracted working time. Furthermore, we find a strong heterogeneity in the effects of works councils across different quantiles of the overtime hours distribution. By considering contracted working time effects and comparing conditional quantiles we find that works council increase the amount of overtime hours if an employee regularly works 35 hours per week. This effect diminishes with increasing quantiles of the distribution of overtime hours. If an employee regularly works 40 hours per week, works councils reduce overtime hours. This reduction becomes larger if higher quantiles are analyzed.

JEL classification: J22, J53, C24

Keywords: Works councils, overtime work, censored quantile regression

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Financial support by the Deutsche Forschungsgemeinschaft (SFB 823,"Statistical modelling of nonlinear dynamic processes") is gratefully acknowledged.

1 Introduction

In the last two decades the topic of overtime work has frequently been investigated, with a substantial number of studies analyzing how labor market institutions affect overtime work. In our approach, we investigate how codetermination at establishment level influences the extent of overtime hours. The German system of industrial relations is characterized by two pillars: unions generally bargain over wages at industry level. Workers are additionally entitled – but not obligated – to elect a works council as an institution of employee representation at establishment level which acts as the workers' voice in negotiations with the management.

Works councils have explicit codetermination and even veto rights regarding overtime. Workers and management preferences frequently differ widely, particularly with respect to the extent of overtime, and in such cases a works council with its legally prescribed codetermination rights might well have an influence on the number of overtime hours supplied. Although our study is restricted to the German system of codetermination, our results provide evidence of general interest in the question of how the amount of overtime worked is affected by the existence of a body of worker representatives, i.e. a representation of the preferences of the supply side, which possesses bargaining power concerning determination of working time. In this sense it is strongly related to the general discussion on the effects of unions on overtime hours[1].

Compared to previous studies, we analyze the determinants of the impact of works councils in a very detailed way. In our study, we identify the effects of works councils on overtime hours based on two factors that strongly influence the employee's decision whether to work *additional* overtime or not. The first factor is the amount of standard working time. The effect of a works council might depend on the standard working hours if works councils intend to prevent excessively long working days. The second factor is the extent of overtime hours itself. The decision of a works council to agree to or to oppose the scheduling of additional overtime hours might strongly depend on the number of overtime hours that are done already. Therefore, in addition to analyzing the effects of works council effects given

[1] Previous studies of this topic mainly focus on the USA and UK. While in the US union coverage seems to reduce the likelihood and amount of overtime hours (Trejo 1993), in the UK Bell and Hart (1999) find positive effects of a collective bargaining agreement on the incidence of overtime. Kalwij and Gregory (2005) however conclude that unions are of minor importance with respect to overtime.

different levels of standard working hours, we additionally use censored quantile regression in order to identify differences in the values of overtime work across the quantiles of its distribution.

With respect to German codetermination rights, only few studies on overtime work exist and these show conflicting results. Kölling (1997), Gold (2004) as well as Schank and Schnabel (2004) use the IAB Establishment Panel, a German panel that contains establishments from all industries, and find positive effects of work councils on the amount of overtime hours. However, in the last study, the results are not robust and the likelihood of the incidence of overtime work is actually reduced in codetermined establishments. Gold (2004) additionally uses the Hannover Panel and finds no effects of works councils. In contrast to the IAB data, this panel only contains data from manufacturing establishments. Hübler and Meyer (1997) also use the Hannover Panel and find similar results as Gold (2004). Jirjahn (2008) additionally controls for the attitude of the management towards employee involvement. Irrespective of the view of the management, he finds no effects of works councils on the incidence of overtime work. All the mentioned studies use establishment data. In contrast we use the German Socio-economic Panel, i.e. individual data[2]. The only study that analyzes the effects of works councils on overtime with individual data is Kraft and Lang (2008). Using a difference-in-differences approach, they investigate how the introduction of a works council affects overtime hours and find no adoption effects. The same study demonstrates that in cases where only the presence of a works council is considered (instead of introduction within a difference-in-differences framework) the amount of overtime work is reduced.

Using the waves 2001 and 2006 of the German Socio-economic Panel we find strong heterogeneity in the effects of works councils on overtime work: if 35 hours per week are the standard working time, works councils increase the number of overtime hours. However, this effect decreases if higher quantiles are considered. If an employee has a 40 hours-per-week contract, works councils always significantly reduce the amount of overtime hours. This effect becomes even more pronounced if higher quantiles are analyzed.

[2] Several studies use this data in order to analyze determinants of overtime work. See e.g. Hunt (1999), Bell et al. (2000), Bauer and Zimmermann (2000). None of these studies, however, control for the effects of a works council.

This paper is organized as follows: in the next section, we discuss the legal background of German codetermination rights and some theoretical background that might explain different effects of works councils on overtime work. The third section describes our data and contains a descriptive analysis of overtime hours. Section 4 contains a description of our econometric approach and a discussion of our results. Finally, we conclude in Section 5.

2 Legal and Theoretical Background

According to Golden (1998) as well as Clarkberg and Moen (2001) actual working time, i.e. the sum of standard working time and overtime work, is determined by the interaction of a) workers' preferences b) employers' demands and c) the institutional environment. In the standard labor supply theory where leisure is a normal good, employees dislike working and marginal disutility rises with the number of working hours so that, given a particular number of standard working hours, (too much) overtime work in particular generates high disutility.

Standard working time varies in Germany between industries and companies[3]. This is relevant in the given context as, with a low number of standard working hours, overtime will not pose less of a problem for workers. In contrast, employees will tend to dislike doing overtime in addition to a high number of standard working hours. In accordance with this theory, surveys show that the majority of workers would like to supply fewer hours (Constant and Otterbach 2011). Although no study exists on possible differences in working time preferences of full-time workers with different standard hours, Holst (2009) points to an asymmetry as part-time employees would like to work more while full-time employees would prefer to work fewer hours.

As argued by Pencavel (1986), employers mostly offer a "take-it-or-leave-it" package concerning working hours that includes standard working hours and requirements concerning overtime working. From the perspective of the employer many factors make a specific number of hours optimal. Theories on the determination of hours focus on fixed (e.g. investment into firm-specific human capital) versus variable costs (overtime premiums)

[3] In Germany, standard working time is usually determined by collective bargaining agreements or, if such an agreement does not exist, individually between employee and employer. Works councils are not allowed to renegotiate parts of a collective agreement as long as such an agreement does not explicitly allow renegotiation with respect to particular topics.

of the factor labor. Higher fixed costs make it optimal to increase the number of hours worked[4]. In some cases employers demand some regular overtime of their workers, or at least they expect a willingness to work overtime if this is necessary for operational reasons such as temporarily high demand for the produced goods.

Beside employees' preferences and employers' demand, the institutional environment both restricts the range of possible working time agreements and also directly affects actual agreements. The institutional environment includes factors such as labor law and regulation, collective bargaining processes, normative practices and the macroeconomic climate. We consider the impact of a very powerful institution of the German labor market on overtime work, works councils. Their legal basis is the Works Constitution Act (WCA), which grants them considerable information, consultation and codetermination rights. Among other things working time arrangements are a major topic on the agenda of a works council. Section 87.1.3 of the WCA defines that works councils codetermine in the setting of temporal changes in agreed working hours. This naturally includes overtime work. The explicit agreement of the works council is required for the use of overtime in an establishment and the works council even has the right to veto overtime work. Hauser-Ditz, Hertwig and Pries (2008) analyze a survey of establishments of the private sector. In this survey 81% of the managers of 1235 codetermined establishments state that working time and overtime agreements are the most important agreements between management and works councils.

Codetermination rights can be used to avoid unhealthy and irksome working conditions. In addition works councils are encouraged to pursue social goals such as the reconciliation of family and working life. Too many working hours strain the worker's health as well as their social life and this may well induce works councils to oppose (too much) overtime work. This opposition will presumably become more pronounced with every additional working hour. In principle, this codetermination right also offers works councils the opportunity to persuade the management to hire additional employees instead of resorting to overtime.

[4] See, e.g. Hunt (1999) and Hart (2004) for a detailed discussion on the overtime decision from a labor supply and labor demand perspective. Additional arguments on hours determination and employees' working hours preferences are provided by Lazear (1981) and Landers et al. (1996).

As mentioned in our introduction, works councils are not mandatory. This offers the opportunity to analyze possible differences in overtime work between employees of establishments with a works council and those without. The use of quantile regressions furthermore allows us to consider the effects of works councils for different quantiles of the overtime distribution and to test the hypothesis that works councils will exert some pressure on the management if overtime hours are considered excessive but will tolerate small amounts of overtime.

In addition, the expected effect of the existence of a works council may depend on the number of standard working hours. If the number of standard working hours is low, additional disutility connected with overtime working will tend to be low and works councils will probably accept overtime work or might even encourage the use of it in order to increase total wage payments. In contrast, if the agreed standard working time already implies many hours, disutility from doing overtime will instead be high and the employees' representative body may well oppose demands of the employers to increase working time.

Contrary to our previous hypothesis that works councils tend to reduce overtime work, an opposite effect might also be conceivable. Besides having a direct influence on overtime, work councils are also able to influence the amount of overtime work indirectly. As stated above, the most efficient number of employees and overtime hours results from minimizing the sum of fixed costs of employment and variable costs (overtime premiums) of the factor labor. Fixed costs include adjustment costs such as hiring and firing costs. Works councils have strong codetermination rights with respect to hires and dismissals. They are able to avoid hires and dismissals for particular reasons[5]. Furthermore, they bargain over redundancy payments if dismissals take place. This clearly influences hiring and dismissal costs and may well imply an indirect influence on overtime work if the cost relation between employment adjustment and overtime has been altered. In this case overtime work would be more frequently observed in codetermined establishments.

[5] See Gralla and Kraft (2011) for a more detailed discussion on codetermination rights of works councils with respect to hires and dismissals.

3 Data and descriptive statistics

For our empirical approach, we use waves 2001 and 2006 from the German Socio-Economic Panel. Further information about this data is provided by Wagner et al. (2007)[6]. We construct a dataset that only contains employees from the private sector between the ages of 20 and 60. We also drop employees from establishments that employ less than 5 workers because these establishments are not allowed to adopt a works council. Table 1 shows the descriptive statistics of our variables.

Our dependent variable is *overtime hours*. This variable measures the mean number of overtime hours worked per week. In our sample an employee works on average 3.071 overtime hours. Table 1 also contains some further variables with respect to overtime that are not used in the estimation but provide additional information on this issue. The dummy *overtime work* shows that 75.5 % of all observations worked overtime. Thus, our dependent variable is left-censored. Of those persons working overtime, the mean length of overtime work is 4.069 hours per week.

Our main independent variable is the dummy *works council*. This dummy has unit value if the observed person works in an establishment in which a works council exists. In our sample 57.6 % of all employees work in codetermined establishments.

Another covariate is the standard working time per week. There is a large number of studies discussing the effect of standard hours on overtime work in a work-sharing context[7]. Both in theory and in empirical studies the effects of standard working time on overtime hours are ambiguous. As mentioned earlier, an attenuation of the effect of standard working hours could be expected in codetermined establishments: if the marginal disutility of work rises with increasing working time and the aim of the overtime policy is avoidance of irksome working conditions, works councils will more often oppose the introduction or increase of overtime hours if standard working time is already high compared to cases where standard working time is rather low. Therefore the effects of works councils on the amount of overtime hours might depend on the level of standard working time. In order to control for

[6] The data used in this study was extracted using the Add-On PanelWhiz for Stata®. PanelWhiz (http://www.PanelWhiz.eu) was written by Dr. John P. Haisken-DeNew (john@PanelWhiz.eu). See Haisken-DeNew and Hahn (2010) for details. The PanelWhiz generated do-file to retrieve the data used here is available from us upon request. Any data or computational errors in this study are our own.

[7] See, e.g., Hunt (1999). Andrews, Schank and Simmons (2005) provide a short summary of previous studies on the effect of a change in standard working hours on actual working hours.

such possible differences we also add an interaction term of works council and standard working time to our model.

Table 1: Descriptive Statistics

	Mean	Std. Dev.
Overtime hours	3.071	3.873
Overtime hours given that person works overtime	4.069	3.977
Overtime work (dummy)	0.755	0.430
Works council (dummy)	0.576	0.494
Agreed working hours per week (x10)	362.461	63.595
University degree (dummy)	0.175	0.380
Vocational training (dummy)	0.700	0.458
Tenure	10.261	9.040
Age	40.788	9.754
Female (dummy)	0.393	0.488
Blue-collar worker (dummy)	0.429	0.495
Firm size: 5-19 workers (dummy)	0.193	0.394
Firm size: 20-99 workers (dummy)	0.222	0.416
Firm size: 100-199 workers (dummy)	0.112	0.315
Firm size: 200-1999 workers (dummy)	0.238	0.426
Firm size: 2000 workers and more (dummy)	0.235	0.424
East Germany (dummy)	0.201	0.401
Obs.	7395	

We additionally control for person-specific characteristics. We control for the effects of education by adding two dummies, *university degree* and *vocational training,* into our model. These variables have unit value if the highest educational degree is a university degree or a completed apprenticeship. We also add the variable *tenure* in our model. This variable measures job tenure in years. In order to control for age effects, we add *age* and age^2 into our model. *Female* measures the effect of gender on the amount of overtime work and this variable has unit value if the observed person is a woman. Finally, we control for

occupation by adding the dummy *blue-collar worker.* This dummy has unit value if the observed person is a blue-collar worker. Differences between East and West Germany are measured by the dummy *east*. Finally, we add a year dummy, five establishment size dummies and nine industry dummies into our model in order to control for year, size and industry effects.

Table 2 shows mean values and tests differences of selected variables between establishments with and without a works council. Based on the full sample, the upper part of the table shows the means of both groups and the differences between them. Both the unconditional mean level of overtime hours and the mean number of overtime hours, given that an employee works overtime, do not differ between employees from establishments with and without a works council. Nor do the incidence of overtime work and agreed working hours . The differences are always positive but of small magnitude and none of the variables are significantly different from each other. In the next step we only consider full-time employees. If we compare the means given that a person works at least 35 hours per week, the sign of the differences changes but they are still insignificant.

Table 2: Mean comparison tests of selected variables

	Works council	No works council	Difference
All			
Overtime hours	3.087	3.050	0.037
Overtime hours given that person works overtime	4.070	4.066	0.004
Overtime work (dummy)	0.758	0.750	0.008
Number of observations	4262	3133	
Only persons with at least 35 agreed working hours per week			
Overtime hours	3.265	3.375	-0.109
Overtime hours given that person works overtime	4.224	4.293	-0.069
Overtime work (dummy)	0.773	0.786	-0.013
Number of observations	3656	2510	

4 Method and Results

Our empirical study is based on two different estimation strategies. In general, we use two samples. The first sample contains all observations. The second sample is restricted to people who work at least 35 hours per week, which implies that this sample mainly contains full-time employees. Using each sample we estimate a model that identifies the effects of the existence of a works council on overtime hours (taking into account influences by other covariates). Based on the second sample we additionally estimate a model that controls for different effects of works councils given the particular level of contracted standard working time i.e. we add the interaction term *works council x agreed working hours* to our model[8].

First, we consider a Tobit model in order to provide results which can be compared with the findings of other studies. Note that this approach only estimates mean effects, i.e. it assumes that the effect of a works council does not differ in different quantiles of the overtime distribution. As heteroscedasticity leads to inconsistent regression results in a Tobit framework, we replace the variance σ^2 in the log-likelihood function by $\sigma_i^2 = \sigma^2[\exp(w_i'\alpha)]^2$. In this expression α is a vector of estimated coefficients of the heteroscedasticity term and w_i is a vector of several size and industry dummies[9]. We also perform Wald tests with the null hypothesis that the size and industry dummies have no influence on σ^2. In every estimated model we have to reject the null of homoscedasticity at 1%-level. Thus, the heteroscedastic Tobit model is the relevant one.

The last two columns in table 3 show the average marginal effects of the work councils dummy (models 1 & 2) and the average marginal effects of the works council dummy given a particular level of the contracted standard hours (model 3). Standard errors are robust and clustered at individual level. We calculate two different types of average marginal effects: the column E(h|h>0) shows the average marginal effect of a works council on the level of overtime hours given that an employee works overtime, while the column Pr(h>0) contains the average marginal effect of work councils on the likelihood of overtime work[10].

[8] We also estimated this model using the full sample. Our results of the interaction term are mainly driven by full-time employees. Thus, we refrain from showing the estimated results of this model based on the larger sample and concentrate on the sample of full-time employees.

[9] See, e.g., Greene (2008) for a discussion of heteroscedasticity in Tobit models.

[10] The average marginal effects are calculated by the margins command of STATA. For a detailed discussion of marginal effects in Tobit models, see Greene (2008). A detailed explanation of the margins command is provided by Cameron and Trivedi (2010).

In model 1 and model 2, we find no significant effects of works councils on the extent and the likelihood of overtime work. However, if we add the interaction term $works\ council \times agreed\ working\ hours$ to our model and calculate average marginal effects given a particular amount of agreed working hours, we find heterogeneous results. Although our specification allows us to calculate the marginal effect at any particular contracted working time, we only show the effects at the levels of 35 and 40 hours. The unions frequently ask for a level of 35 standard hours and, as a rule of thumb, usually 35 hours are regarded as a kind of minimum level of working time in the case of full-time employees. This number of standard working time is effective for 11 percent of our full-time observations. 40 agreed working hours are the mode of standard working time. In our sample, 41 percent of all observations state 40 hours as their contracted working time.

Table 3: Average marginal effects of heteroscedastic Tobit models

	Effect of works councils at … agreed working hours	E(h|h>0)	Pr(h>0)
Model 1	No differentiation	-0.167 (0.110)	-0.019 (0.012)
Model 2	No differentiation	-0.167 (0.126)	-0.017 (0.013)
Model 3	35	0.721*** (0.230)	0.083*** (0.028)
	40	-0.385*** (0.138)	-0.040*** (0.014)

Notes: Model 1 is based on 7395 observations of part-time and full-time employees, Models 2 and 3 are based on 6166 observations of employees with at least 35 standard working hours. ***/**/* indicates statistical significance at the 1%, 5% and 10% level. Standard errors in parentheses are robust and clustered at individual level. Standard errors in Model 3 are calculated by the delta method. For full estimation results see Table A1 in the Appendix.

Table 3 shows that for an employee who has a 35-hour employment contract, the likelihood of working overtime increases by 8.3 percentage points if a works council exists. Additionally, on average he or she also works 0.721 overtime hours more per week. In

contrast, an employee with a standard working time of 40 hours works on average 0.385 overtime hours less. The probability of working overtime also decreases by 4.0 percentage points.

As mentioned previously, Tobit models only estimate the mean effect of work councils on overtime work. Particularly with respect to overtime work the presence of a works council might exert a different influence among different quantiles of the distribution of overtime hours. This hypothesis can be motivated by increasing marginal disutility from working, inducing works councils to prohibit excessively long working days. In order to identify the effect of works councils on different parts of the distribution of overtime hours, we consider a linear quantile regression model (see e.g. Koenker (2005)). To cope with the presence of censoring, we propose the use of the estimator of Peng and Huang (2008). See the description below for more details. In our approach, we focus on the upper part of the distribution that is on quantiles between the median and the 0.9 quantile because we expect an influence of a works council at the upper tail.

Our reasons for choosing the method of Peng and Huang (2008) instead of the Powell (1986) estimator were twofold. First, for the present sample the approach of Powell (1986) presents considerable computational difficulties. Second, as discussed in Koenker (2008), the use of Peng and Huang (2008) methodology has advantages in terms of efficiency, i.e. the estimators typically have a smaller asymptotic variance. A detailed comparison of the two methodologies can be found in Koenker (2008) and Portnoy (2010).

For a precise description of the Peng and Huang (2008) approach, denoted by $\tilde{Y}_{i,j}$ the overtime hours of person *i = 1,…,N* in year *j = 1,…,n_i*, by $Z_{i,j}$ the corresponding covariate and define $\delta_{i,j} = I\{\tilde{Y}_{i,j} > 0\}$ as censoring indicators. The observations corresponding to zero overtime hours are thus considered as left-censored. In order to transform left censoring into right censoring, we `reversed time´, that is we set $\tau = 1 - \tilde{\tau}$ and $Y_{i,j} \coloneqq -\tilde{Y}_{i,j}$. Define an equally spaced grid of quantile values as $\tau_k = \frac{k}{100}$, $k = 0, \dots, 50$. Set $I\{Y_{i,j} \geq \bar{\beta}(0)^t Z_{i,j}\} \equiv 1$ and sequentially define the estimator $\bar{\beta}(\tau_k)$ as approximate solution of the estimation equation

$$\sum_{i=1}^{N}\sum_{j=1}^{n_i} Z_{i,j}\left(\delta_{i,j} I\{Y_{i,j} \le \bar{\beta}(\tau_k)^t Z_{i,j}\} - \int_0^{\tau_k} I\{Y_{i,j} \ge \bar{\beta}(u)^t Z_{i,j}\}\frac{du}{1-u}\right) \approx 0 \qquad (1)$$

with $\bar{\beta}(u) \coloneqq \bar{\beta}(\tau_{k-1})$ for $u \in [\tau_{k-1}, \tau_k)$. The estimators of the coefficients in the left-censored model are now given by $(\hat{\beta}(u))_{u\in[0.5,0.9]} \coloneqq (-\bar{\beta}(1-u))_{u\in[0.5,0.9]}$. Standard errors are estimated by means of a clustered bootstrap method where for each *i = 1,…,N* the observations $(Y_{i,1}, Z_{i,1}, \delta_{i,1}), \dots, (Y_{i,n_i}, Z_{i,n_i}, \delta_{i,n_i})$ were considered as cluster. More precisely, we create N i.i.d. variables $\xi_1, \dots, \xi_N$ that follow an exponential distribution with parameter one and consider estimating equations of the form

$$\sum_{i=1}^{N}\xi_i\sum_{j=1}^{n_i} Z_{i,j}\left(\delta_{i,j} I\{Y_{i,j} \le \bar{\beta}(\tau_k)^t Z_{i,j}\} - \int_0^{\tau_k} I\{Y_{i,j} \ge \bar{\beta}(u)^t Z_{i,j}\}\frac{du}{1-u}\right) \approx 0. \qquad (2)$$

Note that this approach is an extension of the bootstrap proposed by Peng and Huang (2008). The difference is that we account for possible dependencies within clusters. All results in the present paper are based on 100 bootstrap replications. Computation was performed using Roger Koenker's *quantreg* package for the software R. Table 4 shows the results of this approach.

In Model 1, we find that the effect of a works council strongly depends on the quantile under consideration. At q(0.5), i.e. the median, works councils have a negligible effect on overtime hours. In higher quantiles, however the impact of the works council increases: the value of the 0.6 quantile is approximately 15 minutes lower for employees of codetermined establishments compared to employees from establishments without works councils. The difference increases to almost one hour per week at the 0.9 quantile. If we use the sample that only contains full-time employees, the results hardly change. The effect of the works council at the median triples, although it is still insignificant. The coefficients at the other quantiles are comparable to the results of Model 1, although the significance levels at q(0.6) and q(0.7) decrease.

In Model 3, we find a strong heterogeneity in the effects of works councils. On the one hand, the impact of a works council strongly depends on standard working time. On the other hand, it also strongly depends on the regarded quantile of the distribution. Regarding the effects from q(0.5) to q(0.7), the values of the conditional quantiles are approximately 1 hour higher in codetermined establishments than in non-codetermined establishments if an employee regularly works 35 hours per week. This difference, however, decreases at higher quantiles and disappears at the 0.9 quantile.

Table 4: The effect of works councils on overtime hours (censored quantile regression)

	Effect of works councils at … agreed working hours	Quantiles				
		q(0.5)	q(0.6)	q(0.7)	q(0.8)	q(0.9)
Model 1	No differentiation	-0.047 (0.139)	-0.245** (0.114)	-0.361** (0.152)	-0.587*** (0.167)	-0.948*** (0.308)
Model 2	No differentiation	-0.132 (0.160)	-0.194 (0.119)	-0.321* (0.177)	-0.523*** (0.201)	-0.863*** (0.360)
Model 3	35	0.959*** (0.360)	0.953*** (0.366)	1.023** (0.406)	0.762* (0.435)	0.252 (0.531)
	40	-0.341** (0.163)	-0.556*** (0.173)	-0.641*** (0.232)	-1.017*** (0.286)	-1.295*** (0.444)

Notes: Model 1 is based on 7395 observations of part-time and full-time employees, Models 2 and 3 are based on 6166 observations of employees with at least 35 standard working hours. ***/**/* indicates statistical significance at the 1%, 5% and 10% level. Standard errors in parentheses. Standard errors are bootstrapped with 100 replications and clustered at individual level. For full estimation results see Tables A2 – A4 in the Appendix.

In contrast, employees with a 40-hour employment contract always work fewer overtime hours than employees from non-codetermined establishments. We find a significant reduction in overtime hours at the median, and the magnitude of this effect increases with higher quantiles. While at the median an employee of a codetermined establishment works approx. 20 minutes less than an employee from an establishment without a works council, this difference increases to approximately one hour and 18 minutes if the 0.9 quantiles of both groups of employees are compared.

5 Conclusion

Although works councils have extensive codetermination rights with respect to overtime work, only a few studies on this topic exist. In our study, we analyze how overtime working differs between establishments with works councils and establishments without works councils. On average works councils do not affect overtime hours. However, we find a strong heterogeneity in the effects of works councils, which depend on the one hand on the standard working time. On the other hand, the effect of a works council strongly differs among quantiles of the distribution of overtime hours. If the number of regular working hours is low, an employee of a codetermined establishment works more overtime than an employee of a non-codetermined establishment yet this effect decreases with higher quantiles. In contrast, if standard working time is high, works councils reduce overtime working at the median. This prevention effect actually increases with higher quantiles.

Thus the effects of a works council on overtime hours depend heavily on the specific circumstances. How are these somewhat surprising results explained? If works councils do what they are expected to do, namely represent the workers' interests and preferences, the results could be interpreted in the following way: in the case of a working week of 35 hours disutility from working is lower than wages including overtime premiums, but with 40 hours the contrary is true. Work councils do not prevent overtime work in general. Our results provide evidence that they prevent an excessively long working week.

Our approach illustrates the use of quantile regressions to investigate the different effects of an institution like the works council on various regions of the response variable. This demonstrates the potential for further application of this method in many other areas and should help to provide a much more detailed and realistic comprehension of the working of institutions.

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Appendix

Table A1: Heteroscedastic Tobit results

	Model 1 Coeff. (Std.)	Model 2 Coeff. (Std.)	Model 3 Coeff. (Std.)
Works Council	-0.264 (0.174)	-0.252 (0.190)	13.507*** (3.219)
Agreed working hours (week) x 10	0.010*** (0.001)	0.009** (0.004)	0.030*** (0.007)
Agreed working hours (week) x Work Council x 10			-0.035*** (0.008)
University degree	2.409*** (0.298)	2.617*** (0.329)	2.633*** (0.328)
Completed apprenticeship	1.176*** (0.238)	1.312*** (0.265)	1.310*** (0.263)
Tenure	-0.014 (0.009)	-0.014 (0.010)	-0.014 (0.010)
Age	0.252*** (0.051)	0.263*** (0.055)	0.263*** (0.055)
Age^2	-0.003*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)
Female	-1.979*** (0.168)	-1.985*** (0.178)	-1.977*** (0.178)
Blue collar	-1.772*** (0.177)	-1.850*** (0.193)	-1.875*** (0.194)
Size 20-99	0.445** (0.201)	0.393* (0.219)	0.425* (0.219)
Size 100-199	0.527** (0.256)	0.506* (0.278)	0.561** (0.278)
Size 200-1999	0.560** (0.229)	0.420* (0.251)	0.425* (0.251)
Size >1999	0.842*** (0.252)	0.598** (0.275)	0.577** (0.276)
East	0.330* (0.169)	0.203 (0.185)	0.212 (0.185)
Year2006	-0,953*** (0.114)	-0.961*** (0.124)	-0.946*** (0.124)
No. of obs.	7395	6166	
Chi^2-value (H_0: Homosce.) (p-value)	52.47 (<0.001)	45.24 (<0.001)	45.82 (<0.001)

Notes: ***/**/* indicates statistical significance at the 1%, 5% and 10% level. Clustered standard errors in parentheses. Industry dummies included but not reported.

Table A2: Censored quantile regression results, full sample

	Model 1				
	q(0.5) Coeff. (Std.)	q(0.6) Coeff. (Std.)	q(0.7) Coeff. (Std.)	q(0.8) Coeff. (Std.)	q(0.9) Coeff. (Std.)
Works Council	-0.047	-0.245**	-0.361**	-0.587***	-0.948**
	(0.139)	(0.114)	(0.152)	(0.169)	(0.308)
Agreed working hours (week) x 10	0.008***	0.007***	0.008***	0.008***	0.010***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
University degree	2.627***	1.900***	1.877***	2.301***	2.165***
	(0.429)	(0.241)	(0.258)	(0.270)	(0.402)
Completed apprenticeship	1.690***	1.050***	0.695***	0.549***	0.556
	(0.350)	(0.186)	(0.187)	(0.188)	(0.298)
Tenure	-0.008	-0.010	-0.013	-0.026**	-0.033**
	(0.007)	(0.007)	(0.009)	(0.011)	(0.015)
Age	0.193***	0.178***	0.226***	0.268***	0.031***
	(0.047)	(0.055)	(0.037)	(0.047)	(0.088)
Age^2	-0.003***	-0.002***	-0.003***	-0.003***	-0.004***
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)
Female	-1.490***	-1.613***	-1.741***	-2.194***	-2.746***
	(0.104)	(0.129)	(0.173)	(0.161)	(2.180)
Blue collar	-1.360***	-1.346***	-1.184***	-1.293***	-1.624***
	(0.137)	(0.140)	(0.158)	(0.192)	(0.252)
Size 20-99	0.296**	0.390**	0.506***	0.876***	1.702***
	(0.134)	(0.161)	(0.157)	(0.291)	(0.318)
Size 100-199	0.223	0.370	0.578*	0.944***	1.278***
	(0.187)	(0.242)	(0.305)	(0.342)	(0.468)
Size 200-1999	0.241	0.480**	0.593***	0.835***	1.393***
	(0.154)	(0.204)	(0.220)	(0.264)	(0.378)
Size >1999	0.553***	0.881***	1.229***	1.602***	2.390***
	(0.144)	(0.202)	(0.260)	(0.282)	(0.509)
East	0.269**	0.192**	0.216	0.332*	0.451**
	(0.116)	(0.097)	(0.155)	(0.190)	(0.207)
Year2006	-0.750***	-0.583***	-0.563***	-0.590***	-0.609***
	(0.094)	(0.088)	(0.128)	(0.131)	(0.183)
No. of obs.			7395		

Notes: ***/**/* indicates statistical significance at the 1%, 5% and 10% level. Clustered and bootrapped standard errors in parentheses. Industry dummies included but not reported.

Table A3: Censored quantile regression results, full-time employees I

	Model 2				
	q(0.5) Coeff. (Std.)	q(0.6) Coeff. (Std.)	q(0.7) Coeff. (Std.)	q(0.8) Coeff. (Std.)	q(0.9) Coeff. (Std.)
Works Council	-0.132 (0.160)	-0.194 (0.119)	-0.321* (0.069)	-0.523*** (0.201)	-0.863** (0.017)
Agreed working hours (week) x 10	0.000 (0.003)	0.005 (0.003)	0.006 (0.186)	0.012** (0.005)	0.028*** (0.000)
University degree	2.731*** (0.317)	1.940*** (0.267)	2.065*** (0.000)	2.498*** (0.350)	2.472*** (0.000)
Completed apprenticeship	1.774*** (0.284)	1.053*** (0.184)	0.776*** (0.001)	0.674*** (0.194)	0.736* (0.055)
Tenure	-0.009 (0.007)	-0.005 (0.006)	-0.008 (0.325)	-0.028*** (0.011)	-0.029 (0.118)
Age	0.185*** (0.048)	0.170*** (0.040)	0.207*** (0.000)	0.249*** (0.059)	0.290*** (0.001)
Age^2	-0.002*** (0.001)	-0.002*** (0.000)	-0.003*** (0.000)	-0.003*** (0.001)	-0.003*** (0.005)
Female	-1.512*** (0.110)	-1.569*** (0.122)	-1.784*** (0.000)	-2.210*** (0.168)	-2.737*** (0.000)
Blue collar	-1.417*** (0.135)	-1.329*** (0.158)	-1.244*** (0.000)	-1.449*** (0.233)	-1.878*** (0.000)
Size 20-99	0.298** (0.152)	0.318** (0.146)	0.379** (0.032)	0.619** (0.276)	1.553*** (0.000)
Size 100-199	0.258 (0.196)	0.376* (0.215)	0.459* (0.087)	0.758** (0.338)	1.287** (0.041)
Size 200-1999	0.188 (0.164)	0.305* (0.164)	0.376 (0.138)	0.656** (0.301)	1.361*** (0.000)
Size >1999	0.337* (0.188)	0.544*** (0.195)	0.801*** (0.001)	1.255*** (0.328)	2.069*** (0.000)
East	0.231** (0.105)	0.093 (0.137)	0.205 (0.281)	0.028 (0.176)	0.112 (0.667)
Year2006	-0.707*** (0.113)	-0.528*** (0.096)	-0.586*** (0.000)	-0.597*** (0.159)	-0.838*** (0.000)
No. of obs.			6166		

Notes: See Table A2.

Table A4: Censored quantile regression results, full-time employees II

	Model 3				
	q(0.5) Coeff. (Std.)	q(0.6) Coeff. (Std.)	q(0.7) Coeff. (Std.)	q(0.8) Coeff. (Std.)	q(0.9) Coeff. (Std.)
Works Council	10.061*** (3.157)	11.511*** (2.976)	12.707*** 3.542 ()	13.218*** (4.527)	11.076*** (4.200)
Agreed working hours (week) x 10	0.017** (0.007)	0.022*** (0.007)	0.029*** (0.007)	0.034*** (0.009)	0.042*** (0.007)
Agreed working hours (week) x Work Council x 10	-0.026*** (0.008)	-0.030*** (0.007)	-0.033*** (0.009)	-0.036*** (0.011)	-0.031*** (0.011)
University degree	2.850*** (0.356)	2.027*** (0.250)	1.996*** (0.281)	2.476*** (0.338)	2.510*** (0.536)
Completed apprenticeship	1.888*** (0.331)	1.009*** (0.228)	0.634** (0.256)	0.700*** (0.214)	0.755** (0.382)
Tenure	-0.013** (0.007)	-0.007 (0.007)	-0.009 (0.008)	-0.027*** (0.009)	-0.032** (0.013)
Age	0.188*** (0.035)	0.179*** (0.038)	0.223*** (0.052)	0.240*** (0.067)	0.326*** (0.125)
Age^2	-0.002*** (0.000)	-0.002*** (0.000)	-0.003*** (0.001)	-0.003*** (0.001)	-0.004** (0.002)
Female	-1.480*** (0.109)	-1.599*** (0.150)	-1.859*** (0.189)	-2.212*** (0.220)	-2.769*** (0.284)
Blue collar	-1.466*** (0.141)	-1.344*** (0.128)	-1.224*** (0.140)	-1.521*** (0.253)	-1.744*** (0.322)
Size 20-99	0.291** (0.148)	0.366*** (0.137)	0.416*** (0.154)	0.664*** (0.250)	1.569*** (0.476)
Size 100-199	0.318* (0.168)	0.509** (0.233)	0.521** (0.236)	1.013*** (0.281)	1.319*** (0.368)
Size 200-1999	0.164 (0.188)	0.345* (0.203)	0.454* (0.245)	0.747*** (0.287)	1.335*** (0.468)
Size >1999	0.304* (0.183)	0.608*** (0.230)	0.756** (0.298)	1.298*** (0.305)	2.168*** (0.623)
East	0.234* (0.131)	0.037 (0.120)	0.145 (0.206)	0.098 (0.213)	0.038 (0.343)
Year2006	-0.681*** (0.115)	-0.485*** (0.109)	-0.621*** (0.137)	-0.570*** (0.139)	-0.697*** (0.267)
No. of obs.			6166		

Notes: See Table A2.