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GERMAN WORKS COUNCILS AND THE ANATOMY OF WAGES

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GERMAN WORKS COUNCILS AND THE ANATOMY OF WAGES

Abstract

This paper provides the first comprehensive examination of the effect of German works councils on wages, using matched employer-employee data from the German LIAB for 2001. We find that works councils are associated with higher earnings: the wage premium is around 11 percent, and is higher under formal collective bargaining. This result persists after taking account of worker and establishment heterogeneity and the endogeneity of works council presence. Using quantile regressions, we further report that the works council premium is decreasing in the position of the worker in the wage distribution; and is higher for women than for men. Finally, the works council wage premium is associated with longer job tenure, which suggests that some of the premium is a noncompetitive rent. That said, it remains entirely possible that works council 'voice' may dominate its distributive effects, at least insofar as the tenure result is concerned.

JEL Classification: J31, J50.

Keywords: matched employer-employee data, rent seeking, tenure, wages, wage distribution, works councils, collective bargaining.

I. Introduction

The effects of German works councils on most aspects of firm performance – profitability, labor productivity, and employment growth (and, more recently, investment in tangible capital) – have been increasingly scrutinized since the late 1980s. (For a review of the developing literature, see Addison et al., 2004b; and, for some contemporary investment results, see Addison et al., 2007). Altogether less well investigated have been their effects on wages. This seems odd because analysts reporting adverse effects on other outcomes have tended to rely on rent-seeking behavior, and not just heightened bureaucratization, by way of explanation. On closer inspection, however, the source of the comparative neglect of wage determination is data limitations. Typically, plant-level data sets only contain information on average wages, derived from data on the total wage bill and employment. A proper *ceteris paribus* earnings analysis requires the estimation of an augmented Mincerian function on the basis of individual data, without which direct investigation of rent seeking is hamstrung. (Arguably, some research may even have been deflected by the terms of the German legislation – the Works Constitution Act – that formally foreclose wage bargaining by the works council unless this is expressly provided for under the relevant sectoral wage agreement.)

With the recent availability of linked employer-employee datasets we can do much more. Not only can we look at works council effects on wages holding constant human capital, demographic, and other individual (and plant) characteristics, we can also inspect the entire wage distribution. This focus is appropriate because it might be argued that works councils seek equal pay and reduced earnings dispersion as an insurance strategy, reflecting the preferences of risk-averse employees (Horn and Svensson, 1986). Further, an earnings function approach in conjunction with information on tenure permits investigation of explanations other than rent seeking for wage premia attaching to plants with works councils.

In the present paper, we will deploy one such data set, the nationally representative linked employer-employee data set of the IAB, which combines the employment statistics register of the German Federal Employment Agency (*Bundesagentur für Arbeit*) with plant-level data from the Institute for Employment Research (*Institut für Arbeitsmarkt- und Berufsforschung*, or IAB) Establishment Panel. The resulting linked data set is known as the LIAB. It is described in section IV and is prefaced in section III by a statement of our empirical model. Section V then contains our detailed findings organized along the dimensions of wages, the wage structure, and job tenure. All of this is preceded, however, by brief consideration of the institutional background and a review of the sparse existing literature on works councils and wages.

II. The Institutional Setting

Works Councils, Collective Bargaining and the Dual System

Collective bargaining in Germany is formally based on trade unions and employers' associations. With the exception of some firms that conclude their own agreements with unions, collective bargaining over wages and conditions (job classifications, working time, and working conditions) is conducted outside the plant, typically at industry/regional level.[1] Decisions on strikes and lockouts are similarly detached from the plant level. Works councils, on the other hand, focus on production issues, handle individual grievances, and are charged with the implementation of collective agreements at the plant level. They are excluded from negotiating plant agreements (*Betriebsvereinbarungen*) with local management on matters that are covered, or usually covered, by collective agreements unless expressly authorized to do so under the relevant sectoral agreement (under section 77(3) of the Works Constitution Act).[2] Even abstracting from the subtle complication introduced by firms that are not parties to a sectoral collective wage agreement (or *Flächentarifvertag*), works councils have nonetheless typically been involved in wage setting for two main reasons. First, their extensive codetermination rights (noted below) convey power that can be exercised informally. Secondly, wage drift has long characterized wage determination in German manufacturing. One-size-fits-all collective agreements necessarily do not allow for individual needs (historically, those of the high fliers) and they have been accompanied by the lubricant of wage drift. Works councils have therefore actively participated in the fixing of wages above *Tarif* levels and the provision of special bonuses and allowances. Nevertheless, the fact remains that collective bargaining agreements have always been accorded a higher status than workplace agreements.

The functions of works councils are fixed under law. According to the Works Constitution Act, works councils may be set up in all establishments with at least five permanent employees following a petition by a small group of workers or by a trade union represented at the establishment. While mandated, then, works councils are not automatic. Works councilors are elected in secret ballot for a 4-year term, and they represent all workers not just union members. Although works councils are formally independent of unions, as a practical matter ties between the two agencies are close, with three out of five works councilors being union members. Traditionally, they have assisted in union recruitment at the place of work. Because of this function they have been referred to as "pillars of union security" (Müller-Jentsch, 1995, p. 610).

The law provides the works council with far-reaching rights of information and consultation – in areas such as manpower planning, changes in work processes, the working environment, and job content – together with an explicit set of codetermination or joint-management rights on so-called "social matters." The latter include the commencement and termination of working hours, principles of remuneration, pay arrangements including the fixing of job and bonus rates, the regulation of overtime and reduced working hours, holiday arrangements, and health and safety matters. The works council also enjoys 'consent rights' in matters of hiring and firing as well as job classification (the placement of workers in certain wage groups). Further, works council authority – as indexed by formal competence and size (including the number of full-time councilors) – is increasing in establishment size.

Over time the competence or authority of the works council has increased. The first Works Constitution Act in 1952, which still forms much of the basis of the information, consultation, and codetermination right of the works council, emphasized the independence of the works council and recognized only limited rights for unions in the plant. Works councils were also prohibited from striking, as indeed they still are. The second Works Constitution Act in 1972 materially extended the information and consultation rights of the works council in respect of management decisions involving changes in capacity, working operations, and production processes, as well as strengthening codetermination rights by allowing for adjudication in the event of an impasse. It also improved the access of unions to the workplace and permitted them to submit lists of candidates in works council elections, as well as allowing works councilors to hold union office. The most recent legislation – the 2001 Works Constitution Reform Act – sought to stimulate works council formation, to strengthen existing works councils (e.g. by increasing the number of full-time works councilors), and to improve the operation of the works council apparatus. In the latter exercise, cost was said to be secondary to democracy at the workplace (for details, see Addison et al., 2004a). That said, acceptance by management of the entity seems to have grown. The reason is that, while typically cut from the union cloth, works councilors are often seen as more pragmatic and flexible than unions.

Works Councils and Wages

As noted earlier, there is comparatively little information on the effect of works councils on wages. The literature on the impact of collective bargaining proper on wages is also sparse (see below). As far as works council impact is concerned, the early literature comes to different conclusions. Thus, in their analysis of 60 firms in the metal working

industry, using pooled data for 1977 and 1979, FitzRoy and Kraft (1985) fail to detect any positive effect of works councils on wages.[3] Rather, the authors attribute the adverse effect of works councils on their performance measure – specifically, firm profitability – to slower decision making rather than to rent seeking. By contrast, in an analysis of 50 industrial firms in 1990/91, Addison et al. (1993) obtain a significantly positive coefficient estimate for a works council dummy variable in their OLS and least median of squares/reweighted least squares wage regressions (see also Meyer, 1995a).

More recent studies using larger datasets also present a mixed picture. In an analysis of the first wave of the *Hannoveraner Firmenpanel*, covering manufacturing establishments in Lower Saxony, Addison et al. (2001) report in OLS wage regressions that wages are approximately 15 to 18.5 percent higher in works council regimes. The authors also investigate the gap between the wage fixed at industry/regional level and that paid at the establishment, using management-reported estimates of the percentage wage gap (*übertarifliche Entlohnung*).[4] The authors' Tobit estimates fail to indicate any influence of works councils on the wage gap for either blue-collar or white-collar employees. However, in exploiting a question in the panel inquiring of managers whether or not the works council was jointly involved in determining the wage gap, Addison et al. (1997) report that the gap is higher where the works council is involved in wage determination.[5]

The most recent study to investigate works council wage effects also uses (two waves of) the Hannoveraner Firmenpanel. Hübler and Jirjahn (2003) offer a test of the Freeman-Lazear (1995) model that, where a council coexists/is embedded in a collective bargaining agreement, councils and local management are likely to maximize the joint surplus. In contrast, where there is no collective agreement (external to the firm) there is said to be little to constrain rent-seeking councils.[6] Interestingly, Hübler and Jirjahn report no evidence of an independent effect of collective bargaining on wages, which they justify on the grounds that the outcome of collective agreements is usually extended to the overwhelming number of employees in an industry (but see Kohaut and Schnabel, 2003, and Addison et al., 2006, for a discussion of the erosion of collective bargaining coverage).[7] For their part, works councils are found to have a positive effect on wages, which outcome is more evident for the uncovered sample. (They are also associated with a well-defined positive effect on productivity in the covered sector.) Somewhat consistent with Hübler and Jirjahn, a recent study by Gürtzgen (2006), using IAB longitudinal data, reports that *rent sharing* is unrelated to collective bargaining coverage once one accounts for unobserved plant heterogeneity and the endogeneity of rents. Unlike these authors, however, she argues that unions favor a compressed intra-industry wage structure and

suppress the responsiveness of wages to firm-specific profitability considerations. Contrary to Hübler and Jirjahn, Gürtzgen further reports that her well-determined positive association between works councils and rent sharing found in pooled OLS estimates does not survive the application of dynamic panel estimates.

The remaining studies that examine the link between collective bargaining proper and wages do not control for works council presence. Using the same dataset as that employed in the present paper, albeit for 1996 rather than 2001, Kölling et al. (2005) find that, unlike Hübler and Jirjahn, collective bargaining at sectoral level raises wages, at least for the least-skilled workers. Another study by Stephan and Gerlach (2005), again using linked employer-employee data – but this time for Lower Saxony – for the years 1990, 1995, and 2001 reports evidence of a rising wage premium over time for the average covered worker. Specifically, the wage gain for working under an industry-level collective bargaining agreement increased from 4 percent in 1991, through 9 percent in 1995, to 12 percent in 2001.

As we see it, the suggestions derived from the empirical literature are as follows. First, and most important, works councils may indeed influence wages, despite section 77 (3) of the Constitution Act. But the manner of that influence can be subtle; in particular, the effect may vary along the skills continuum and the wage distribution. Further, in circumstances where that effect hinges on management being willing or choosing to discuss supplementary payments, the premium may reflect the payment of efficiency wages. Second, albeit more controversially, collective bargaining proper may be expected to influence wages in Germany no less than in other nations. The main qualification here has to do with the union-works council nexus.

III. Methodology

Earnings regressions

Our starting point is the standard Mincerian earnings function in which the (log) wage of individual i, y_i, is a function of (observed) productive characteristics, X_{1i}, to include both general and specific skills (proxied by schooling, tenure, and occupation), and control variables specific to establishment j, Z_j. In particular, we are interested in the specific role of the works council institution, F_j. We thus specify the model

$$y_i = X_{1i}\beta_1 + Z_j\beta + F_j\delta + \varepsilon_i. \qquad (1)$$

It is natural to assume that this model suffers from heterogeneity bias (or omitted variable bias), in the sense that not all relevant individual (productive) characteristics are observed (or collected by the researcher). If unobserved individual heterogeneity is

assumed to be correlated with the observed characteristics, then it is straightforward to show that the (OLS) coefficients estimates of model (1) will be biased.[8] One way to control for heterogeneity bias is to assume that workers in the same workplace share some common (unobserved) characteristics. Adding establishment-average coworker characteristics X_{2j} to equation (1) may therefore enable us to control for a key source of contamination. Accordingly, we have

$$y_i = X_{1i}B_1 + X_{2j}B_2 + Z_jB + F_j\delta + u_i. \quad (2)$$

.

Finally, to control for the possibility of an establishment 'self-selecting' into works council status, we add to the model the predicted propensity score – that is, the estimated probability of a given establishment having a works council, $\hat{p}_j$, giving

$$y_i = X_{1i}B_1 + X_{2j}B_2 + Z_jB + F_j\delta + \hat{p}_j\lambda + \varepsilon_i. \quad (3)$$

By construction, X_{2j} allows us to get rid of the correlation between unobserved worker ability and works council status, while $\hat{p}_j$ controls for the potential endogeneity of the works council dummy in the wage equation. By reason of the inclusion of X_{2j} and $\hat{p}_j$ in equation (3), δ is not expected to be correlated either with unobserved worker ability or with unobserved establishment-specific characteristics. (Familiarly, the introduction of $\hat{p}_j$ is valid under the assumption that the unobserved wage determinants are not correlated with works council status.)

Model (3) will be estimated for all workers and for males and females separately, using both OLS and quantile regression methods. This allows us to inquire into the anatomy of the works council wage mark-up for different groups of employees. In this context, we will also exploit the interaction between works councils and selected variables (namely, gender, schooling, and collective bargaining coverage). In this case, and now omitting the other covariates for convenience, the corresponding empirical model can be formulated as

$$y_i = a_0 + (1 - F_j)S_i\lambda_0 + F_j\delta + F_jS_i\lambda_1 + \varepsilon_i, \quad (4)$$

where *S* denotes the set of selected variables that interact with the works council dummy, *F*.

Job Tenure

As hypothesized earlier, the payment of higher wages in works council establishments may reflect either the ability of works councils to extract a bigger slice of the pie

(surplus) *or* the ability of firms to extract greater effort from workers (for example, via the payment of efficiency wages). In the former case, workers are paid above 'normal' wages and we should observe, all else constant, higher tenure, T_i. In the latter case, establishments pay a compensating differential so that no correlation between tenure and works council status should be expected.

To test these conflicting hypotheses, we first specify the following base model

$$T_i = X_{1i}B_1 + X_{2j}B_2 + Z_jB + F_j\delta + e_i. \quad (5)$$

As in the case of wages earlier, the parameter estimates – in particular, the coefficient δ – may be biased. In order to capture the true impact of works councils on tenure, we will adopt the strategy followed by Card and de la Rica (2006) in this *Review*. Specifically, in a first step, we look at the wage profile of workers unaffected by works council activity by estimating equation (2) for the sample of workers in non-works council establishments. We next interact the predicted (log) wage, $\hat{y}_i$, with the works council variable F_j, giving

. (6)

The parameter $'$ will then give the impact of works councils on tenure after controlling for the average (non-works council) effect of wages on tenure.

This modeling strategy is explicitly designed to test whether, *cet. par.*, employees in establishments controlled by a works council tend to have higher tenure than their non-works council counterparts. Assuming that wages increase tenure – and ignoring for now the possibility of reverse causation (or simultaneity) – one should indeed expect the causal effect of wages to differ across plants if the two types of establishment attract substantially different types of workers, irrespective of whether the works council differential is increasing or decreasing over the wage distribution. But where the wage gap is declining, there is the risk of not observing any statistically significant association between higher (predicted) wages and greater tenure, not because the institution is irrelevant but because its effect may be too small.

In these circumstances, it seems worthwhile to test whether the effect of works councils varies across the distribution of tenure; that is to say, whether individuals with longer tenure are indeed those who benefit most from works councils. We implement this inquiry by running a quantile regression on model (6) to check whether the parameter $'$ is increasing across quantiles, with an increasing $'$ being taken as evidence in favor of works council involvement in rent-seeking.

A final issue is connected with the hypothesis that works councils may generate both improved decision-making – and hence higher surplus – and 'monopoly' wages (i.e. higher wages than the 'competitive,' non-works council level). In this case, longer tenure might reflect the fact that higher wages are generated by heightened worker involvement in decision-making, not to be found in establishments without works councils. This is the notion of collective voice. If the amount of participation sought by workers is not too high, worker participation can indeed be optimally chosen by a profit maximizing firm given appropriate institutional constraints (e.g. Lazear, 1995). Now, both higher wages and higher tenure attend the works council institution. In these circumstances, model (6) may be ill-suited to differentiating rent-seeking from the efficiency argument.

One means of further examining this issue is to run a standard Freeman-Medoff (1984) model in which (log) tenure is regressed on works council status and (log) wages together with the usual set of controls. The works council dummy and log wages will now proxy 'voice' and 'monopoly' effects, respectively. Formally, this model can be formulated as

$$\ln T_i = a + F_j\delta + y_i\delta_1 + P_i\lambda + e_i, \qquad (7)$$

where P composites all relevant individual and establishment-level explanatory variables and y_i denotes the (log) wage.[9]

Arguably, an alternative procedure might be to run a modified version of model (7) in which tenure is regressed on a works council dummy and expected wages $\hat{y}_i$ (rather than on observed wages y_i), and then compare the results with the Card and de la Rica (2006) specification in model (6), above. In this case, the works council coefficient would give the effect of the works council on tenure either through higher than competitive wages or higher efficiency. Unfortunately, the Card and de la Rica model cannot estimate the 'main' effect of the predicted wage, $\hat{y}_i$, on tenure since by construction the set of regressors in the predicted wage equation is the same as the set of control variables in the tenure equation.

IV. Data

Our data are taken from the 2001 wave of the LIAB. As noted above, the LIAB combines Federal Employment Agency employment statistics with plant-level data from the IAB Establishment Panel. The distinctive feature of the LIAB is the combination of information on individuals and details concerning the establishments that employ them.

The employment statistics are drawn from the German employment register, which contains information on more than 98 percent of the employees and trainees included in the establishment panel (Alda, 2005). The employment register was established in 1973 to integrate the notification procedures for social security (pensions, health insurance, and unemployment insurance). Information is recorded at the start and end of the individual's employment spell within a firm and in annual end-year reports. The employment statistics contain data on the individual's three-digit occupation, daily gross wage up to the earnings ceiling for social security contributions, gender, year of birth, nationality, marital status, number of children, and schooling/training. Each individual record also contains the establishment identifier, as well as the size and industry affiliation of that establishment.

To take account of the top coding of earnings found for roughly 11 percent of the sample, we imputed wages for those employees at the censored level. To this end, we first created 20 cells differentiated by gender, education (the six schooling groups identified in Appendix Table 1) and nationality (German versus non-German), and ran censored wage regressions for each. The covariates comprised tenure, tenure squared, age, and binary variables for sector, location (western/eastern Germany), and skill. (Our procedure recognizes that the level at which wages are top coded differs between eastern and western Germany.) Predicted wages for each censored observation were then calculated and assigned for each individual.

For the purposes of the present inquiry it was also necessary to have data on length of tenure. However, and similar to the information on wages, the tenure data are also censored. In the case of western Germany some 9 percent of employees have their tenure censored (at 25 years of tenure), while for eastern Germany 35 percent of the sample have censored tenure data (at 10 years of tenure). Since most of the censored individuals are employed in works council establishments, dropping them may be expected to materially bias the results. For this reason, we decided to impute tenure using the same procedure as described above for wages.

The plant-level component of the LIAB, the IAB Establishment Panel, was initiated in 1993 (Kölling, 2000). It is based on a stratified random sample – strata for 16 industries and 10 employment size classes – from the population of all establishments

employing at least one employee paying social security contributions. Although larger plants are over-sampled, within each cell the sampling is random. In 2001 the sample comprised 14,878 plants and some 2.5 million employees.

The IAB Establishment Panel was created to meet the needs of the Federal Employment Agency for improved information on the demand side of the labor market. Accordingly, information on the workforce and its decomposition and development through time are central elements of the Panel questionnaire. Further questions concern the establishment's sales, exports, investment expenditures, age, and corporate form/legal status. Yet others include the size of the overall wage bill, training provision, hours worked, technical status of equipment, overtime payments, and collective bargaining status. Most such questions are asked annually.

In summary, the LIAB is created by linking the employment statistics of the Federal Employment Agency with the IAB Establishment Panel via the plant identifier available in both data sets. The information on length of tenure, in particular, first became available in the 2001 wave. This is an important reason to use this wave of the LIAB. Moreover, since some key establishment variables pertaining to 2001 are only available in the 2002 IAB Establishment Panel, we merged this information with the 2002 wave. Our selected establishments are thus required to be in both waves. Sectoral coverage includes manufacturing and services, and excludes not-for-profit organizations. In addition, only full-time individuals aged between 19 and 65 years are included in the sample (apprentices were excised). Finally, in order to include only establishments where in principle works councils can be present, we dropped all workers in establishments with less than five employees. Matching the selected employees to the selected establishments resulted in an estimation/regression sample of 1,344,656 workers across 8,579 establishments.

In order to investigate the robustness of our results, we also ran the same estimations for establishments with 21 to 100 employees. There are two reasons to choose plants within this size interval: in the first place, the powers of their councils are to all intents and purposes fixed (otherwise, they are increasing in establishment size); and, in the second place, only a tiny minority of smaller plants with less than 21 employees have works councils while the large preponderance of establishments with more than 100 employees have them (Addison and Teixeira, 2006). For our sample of establishments with 21 to 100 employees, roughly 38 percent of establishments and 45 percent of employees are covered by works councils.

V. Findings

Summary data on worker (mean) characteristics for the entire sample and also by gender and works council status are given in Table 1. Clearly, workers in works council establishments have higher wages than their non-works council counterparts (with log daily wages of 4.591 and 4.131, respectively) and males also earn more than females (log wages of 4.609 and 4.369, respectively).[10] The standard deviation of log wages is also higher in non-works council than in works council establishments at 0.373 and 0.477, respectively. In turn, job tenure is longer in establishments with works councils than in establishments without works councils: 10.017 versus 5.224 years. White-collar workers are more prevalent in works council establishments, while conversely low skilled blue-collar workers outnumber those in non-works council workplaces by an 11 percentage point margin.[11] Overall, the proportion of workers in the two lowest skill categories, if not educational categories, is also higher in establishments without works councils. Not surprisingly perhaps, collective bargaining coverage is almost universal (94 percent) for workers in works council establishments and much lower in the case of plants without them (42 percent). But differences in collective agreement coverage by gender are minimal, and the same is true for gender differences in schooling. In sum, the observed worker characteristics in our sample are reminiscent of those reported in the union-wage literature: like union workers, employees in works council establishments have higher wages, higher skills, higher tenure, and lower wage dispersion.

(Table 1 near here)

Corresponding establishment means are presented in Appendix Table 2. Observe that there are fewer works council establishments than non-works council establishments, the latter outnumbering the former by a twelve percentage point margin. Disparities with respect to the means reported in Table 1 reflect the fact that bigger establishments (namely, those with 250 or more workers) have almost complete works council coverage. Wages are 42.3 percent higher in works council establishments and tenure is 2.8 years longer. Collective bargaining coverage is also much higher in works council establishments. Finally, establishment-level data point to lower tenure on average among women than men, while overtime supplements are also much more frequent among men. These two aspects may be expected to contribute to the observed wage gender gap of a little over 20 percent in favor of men, observed at both individual and establishment level.

(Table 2 near here)

Table 2 presents the OLS wage regressions with different sets of regressors according to equations (1) through (3). The first column of the table confirms the 0.46 (log) wage differential in favor of works councils earlier reported in Table 1. This

premium falls dramatically (by around three-quarters) once establishment and individual employee characteristics are added to the specification. This means that a large share of the wage gap can be explained by systematic sorting of firms and employees. Specifically, after adding worker characteristics the works council wage differential is around 14.1 percent (column 2) and this falls to 11.7 percent (column 3) with the further addition of plant characteristics and the proxies for differences between workers (the average co-worker variables). The covariates have the expected signs (see, for example, Card and de la Rica, 2006). That is, wages increase with age, tenure, qualifications, and professional status. They are lower for women and foreigners. Further, wages are higher in larger establishments, in establishments applying collective wage agreements, as well as in establishments reporting high profits and paying overtime supplements.

There is little indication that self-selection into works council status accounts for much of this (reduced) wage premium. The propensity score coefficient is statistically significant but, comparing columns (3) and (4), it can be seen that there is only a trivial increase in the differential – from 11.7 to 12.1 percent – with the addition of this argument. The propensity that a works councils is present is calculated using the standard covariates (see Addison et al., 1997): establishment size and establishment size squared, the share of blue-collar, temporary workers, female, and part-time employees, establishment age (dummy), collective bargaining (at establishment and sector level), payment above levels set under collective bargaining, the profit situation (dummy), location (in eastern versus western Germany), and 16 sector dummies – the Probit regression, not reported here but available from the authors on request, is well defined with a pseudo-R^2 of 0.37, and all covariates (other than payment above the collective bargaining level) are statistically significant at conventional levels and of the expected sign.

The premium associated with collective bargaining coverage (at either sectoral or establishment level) is around 6 percent. This is one-half the value reported by Stephan and Gerlach (2005, p. 2301) in their study of Lower Saxony for 2001, but taken together the two sets of findings using matched employer-employee data help dispel the illusion that extension of coverage implies the absence of a union premium.

(Table 3 near here)

Turning to the separate results by gender in Table 3, we obtain the interesting *ceteris paribus* result that the presence of a works council benefits female workers in particular. Since women have lower wages on average, this finding implies that the institution attenuates the gender differential in Germany. This attenuation is also reported by Gartner and Stephan (2004), using the decomposition suggested by Juhn et al. (1993).

As shown in Appendix Table 3, column (1), we obtain the same result if we pool the two sub-samples (of men and women workers) and interact the works council argument with a female dummy variable. It is estimated in this case that the wage gender gap in works council establishments decreases by 10.3 percent.

(Table 4 near here)

The presence of a gender gap is also confirmed in Table 4, which focuses on schooling level. It can be seen that the wage premium associated with works council presence is broadly though not monotonically decreasing in the skill (or schooling) level, namely, from around 11.9 percent for the least skilled (secondary education without a professional qualification) to 9.1 percent for workers with a university degree. So there is some indication that works councils play a role in wage compression, narrowing to some degree the wage gap between high- and low-schooling individuals and the gender wage gap. That said, this picture is less evident when we interact the works council dummy with the education dummies (see Appendix Table 3).

(Table 5 near here)

Table 5 gives some results from fitting quantile regressions to our earnings data for all workers and separately by gender. The table provides results for the 0.2, 0.4, 0.6, and 0.8 quantiles. We see that the wage premium for being covered by a works council is significantly declining in earnings for the entire sample and also for men and for women.[12] For females, the premium for the 0.2 quantile is 20.8 percent as compared with only 12.7 percent at the 0.8 quantile. The differences for men are more muted at 11.6 and 6.9 percent, respectively. These results show again that works councils have an impact on wage compression in Germany.

The wage impact of works councils might be dependent on the collective bargaining regime. We therefore also interacted the works council dummy with our two collective bargaining variables (at sector and firm level). The results are reported in Appendix Table 3. From the second column of the table we find confirmation of Hübler and Jirjahn's (2003) result that works councils do have an independent impact on wages in the order of 10.6 percent – but observe that the works council effect differs by type of collective agreement. For establishments covered by sectoral collective bargaining the works council effect is 10.3 percent, whereas for firm level bargaining the corresponding premium is some 23.1 percent. This might be an indication that works councils indeed use their bargaining power if there is some leeway in establishment-level wage bargaining. As a practical matter, however, given that there is a works council we observe minor differences between wages in the two collective bargaining regimes.

The impact of works councils on the wage structure can also be examined using wage dispersion information aggregated at the establishment level. To this end, we computed two straightforward measures of wage dispersion within establishments: the standard deviation of individual wages and the coefficient of variation (the standard deviation divided by average individual wages). The bottom line is that there is again evidence of works councils reducing wage dispersion (irrespective of the collective bargaining regime). However, the reductions in the standard deviation and the coefficient of variation of wages in works council establishments are only in the order of -0.8 and -0.02, respectively. Full results of this exercise are available from the authors on request.

(Table 6 near here)

Finally, we tackle the important issue of whether higher tenure is a consequence of rent-seeking or efficiency wages. We estimate the tenure model given by equations (5) and (6). The results are reported in Table 6. If works councils imply higher wages, workers in establishments with works councils will ceteris paribus tend to have greater tenure. The results in the first column of the table confirm this: the coefficient estimate for the works council term is positive and statistically significant, indicating that workers in establishments with works councils do indeed have higher job tenure. On average, workers covered by works councils have 1.6 years of additional tenure. Observe that since the estimated model contains one dummy for each year of age, we are strictly comparing individuals of the same age. The works council effect on tenure of male and female workers is virtually the same.

The tenure regression in the first column of Table 6 does not include a direct control for wages. A strong and enduring finding in the literature is that the higher are earnings, the lower is turnover and thence (abstracting from the issue of the effect of tenure on earnings) the higher is tenure (Farber, 1994). In order to isolate the effect of works councils on tenure *and* address directly the wage impact on tenure, we follow the approach by Card and de la Rica (2006), which as we have seen involves first identifying the wage profile in other than works council establishments and then interacting the predicted wages obtained from this regression with the works council dummy. The logic behind this approach is that if the wage premium is a compensating differential – or a return to unmeasured quality differences between workers – it should not necessarily influence job tenure. The results of this exercise are reported in the second column of Table 6. For the entire sample, the coefficient estimate for the interaction term is positive and statistically significant, indicating that the tenure gap is increasing in (expected) wages. The size of this effect is nevertheless rather small: wages have almost to double to generate an additional year of tenure. This result suggests that while works councils

increase wages (and tenure) of all workers, the major implication seems to be a more compressed wage structure, which is then translated into a relatively small tenure gap over the distribution of wages/skills. As is readily apparent from the results in the last two columns of Table 6, the results carry over to male workers, but for females the coefficient estimate for the interaction term is both smaller and statistically insignificant.

(Table 6A here)

To further comment on the profile of job tenure in connection with works councils, we next present in Table 6A the results from a quantile regression on tenure model (6). The goal, it will be recalled, is to test whether works councils have a higher/lower impact at higher reaches of the tenure distribution. Column (1) of this table confirms the OLS results reported earlier in column (1) of Table 6, namely, that works councils are associated with higher tenure. The works council effect is roughly constant across the four selected tenure quantiles at around one to one and one-half years extra tenure. Since column (1) ignores the role of wages, the more interesting case is given by the specification in column (2) which contains the wage variable in interaction with the works council dummy. After taking the wage variable into account, there is evidence that works councils do generate longer tenure. Moreover, the gap is increasing at higher reaches of the tenure distribution; specifically, it is three years for the top 0.8 quantile and less than one year for the 0.4 quantile (and is even negative for the bottom 0.2 quantile). On this implementation, then, the suggestion is that rent-seeking might be nontrivial when a works council is present.

At this stage it is also worthwhile attempting to disentangle the relative importance of wages versus works council regime on the tenure profiles of individuals through a different route also suggested in section III. The question is again whether the observed longer tenure in works council plants results from the greater attractiveness/efficiency of workplaces with works councils or rather reflects the outcome of a rent-seeking process (respectively, the 'voice' versus 'monopoly' union arguments adapted to the institution of the works council). We carry out this test by implementing the Freeman-Medoff tenure model described in equation (7). It will be recalled that the two effects –voice and monopoly – are assumed to be captured simply by looking at the corresponding elasticity.

(Table 7 near here)

The results are given in Table 7. As in equations (5) and (6) above, this approach assumes away the simultaneity bias arising from the possibility that wages increase with tenure and also the possibility that innately more stable individuals might select into works council establishments (Freeman, 1980, claims that both biases are of a second

order of magnitude). The apparent outcome, here as elsewhere, is that the voice/efficiency argument dominates the monopoly argument: the presence of a works council implies a 40 percent increase in job tenure, while roughly a 70 percent increase in wages would be required to obtain an equivalent percentage increase in job tenure. Interestingly, these numbers are of much the same order of magnitude as those reported by Freeman and Medoff (1984, Table 6-2) for unions in the United States.

All the above results pertain to our full sample of establishments. As a robustness check on our results, we finally offer some corresponding evidence for a sub-sample of establishments employing 21-100 employees. This sub-sample is more homogeneous for the two reasons noted earlier: first, works council powers are virtually a datum within this size class interval, whereas they are more generally increasing in employment; second, the distribution of establishments with and without works councils is more even (works council density is otherwise sharply increasing in establishment size). The sub-sample contains many fewer individuals (some 100,000 workers in 3,000 establishments). The descriptive statistics are contained in Appendix Table 4(a), from which it can again be seen that average (log) wages and job tenure are higher in works council establishments. Further, employees' qualifications and age are also slightly higher in these establishments. Finally, plants with works councils are less prone to report high profits, use modern technical equipment, or pay overtime supplements.

The material in Appendix Tables 4(b) through 4(e) makes clear that there is a clear reduction in the works council premium in the sub-sample of establishments employing 21 to 100 employees.[13] At the risk of some over-simplification, the wage effect of works councils is reduced by 30 to 50 percent in comparison with the results for the entire sample. This provides evidence that establishment size matters. Works councils are again more favorable to women than men, but the role of councils in reducing wage dispersion is less evident. Indeed, differences in the works council coefficient estimates in the quantile regressions are minimal, and are even increasing for males (see Appendix Table 4(e)).

Finally, from Table 4(f), there is evidence that works councils significantly increase job tenure in the restricted sample (by an extra 0.8 years) as in the full sample, but no evidence that increased tenure comes about through via higher wages as the interaction term (predicted wages*works council) is never statistically significant. The results from the Freeman-Medoff model suggest in turn that the voice argument is less important for this employment size interval than for other establishments: the works council dummy is clearly smaller while the wage impact on tenure is comparable (see

Appendix Table 4(g) and compare with Table 7). This result is not altogether unexpected because the voice shortfall is less compelling in smaller establishments.

VI. Conclusions

This paper has looked at the works council impact on the anatomy of wages in Germany. It has demonstrated that the positive impact of the entity on wages is higher than that of collective bargaining proper either at sectoral or firm level. Works councils are, then, associated with a wage premium despite the fact that they are formally enjoined not to engage in wage bargaining. To our knowledge, this is the first occasion on which this result has been reported for matched-employer-employee data, although it has been observed before in establishment panel data sets using information on average earnings. But note that in the present treatment we were better able to control for unobserved worker and establishment heterogeneity while still accounting for the selection of plants into works council status.

Another potentially important result, generated from our quantile regressions, was that the wage effect tends to be greatest lower down in the earnings distribution, analogous to results reported for formal collective bargaining (even if this result either did not obtain or was muted for smaller establishments.) Seemingly, works councils reduce the standard deviation of wages and the coefficient of variation of wages in a manner comparable to collective bargaining. In contrast to the literature on collective wage agreements, however, we found that women profit more from the presence of works councils than do men and that, accordingly, works councils attenuate the gender wage gap.

Wage compression is higher in Germany than in most other industrialized countries (Fitzenberger, 1999), and is associated with high and persistent unemployment that mainly affects lower-skilled employees and those who previously worked in jobs at the bottom end of the wage distribution (Siebert, 1997). Although there are many different explanations for why wages in Germany are so compressed (and remain so), few if any of them seem to be convincing (Muysken and Zwick, 2006). Again, subject to the caveat provided by our results for the restricted firm sample, the institution of works councils therefore provides an additional potential explanation that has heretofore received scant attention.

Finally, we also investigated whether the longer tenure of employees in works councils establishments reflected higher wages, signaling rent extraction, or compensating differentials. Once we interacted predicted wages from an equation describing wages of employees in establishments without works councils with the works

council dummy, we found that only a small part of the higher wages seem to indicate rent seeking. This finding was confirmed by comparing the direct effect of wages and works councils on tenure using the Freeman-Medoff (1984) approach. Consistent with the wider German literature, however, there were few indications of beneficial voice emanating from works councils in smaller establishments.

Endnotes

[1] Although we should note that since 1990 firm-specific agreements have become more common in Germany (see Hassel, 1999; Kohaut and Schnabel, 2003).

[2] Recently, sectoral collective agreements have made explicit allowance for local bargaining through *opening* (and *hardship*) clauses – first in respect of working time and then for wages and salaries – although the bargaining parties at sectoral level retain the right to veto such agreements negotiated at plant level between the firm and the works council.

[3] Rather, the wage relation observed is between union density and wages and even here the link is indirect.

[4] Earlier research looking into the wage gap either reports no works council effect or even a negative influence (see, respectively, Meyer 1995b; Bellman and Kohaut, 1995).

[5] The authors use two works council variables, the second identifying situations in which works councils are reportedly not involved in determining the wage gap. The omitted category is absence of a works council of any form.

[6] Hübler and Jirjahn (2003) argue that it is in the interests of both the employer side at industry/regional level *and* the union to prevent works councils from rent seeking.

[7] The current position is that around 49 percent of establishments in western Germany are covered by sectoral collective agreements that apply to some 65 percent of employees.

[8] For example, assuming $e_i = a_i + \varepsilon_i$ and $a_i = X_{1i}\phi_a + F_j\mu_a + a'_i$, it follows from equation (1) that $y_i = X_{1i}(B_1 + \phi_a) + Z_j B + F_j(\delta + \mu_a) + (a'_i + \varepsilon_i)$. In this case, we can conclude that both B_1^{ols} and δ^{ols} from model (1) will be biased as the corresponding measured effects will include the biases ϕ_a and μ_a, respectively (Card and de la Rica, 2006). Similarly, in the presence of an establishment-specific term, we would have $e_i = a_i + v_j + \varepsilon_i$, $a_i = X_{1i}\phi_a + F_j\mu_a + a'_i$, $v_j = X_{1i}\phi_V + F_j\mu_V + v'_j$, and $y_i = X_{1i}(B_1 + \phi_a + \phi_V) + Z_j B + F_j(\delta + \mu_a + \mu_V) + (a'_i + v'_j + \varepsilon_i)$.

[9] A theoretical derivation of this model can be found in Freeman (1980, p. 649).

[10] Given that $\ln((w_1 + w_2 + ... + w_n)/n) \geq (\ln w_1 + \ln w_2 + ... + \ln w_n)/n$, the corresponding daily (arithmetic) average wage is at least 98.592, 62.240, 100.384, and 78.965 Euros, respectively.

[11] The other skill levels are evenly distributed across works council and non-works council establishments.

[12] Interquantile regression comparisons show that the presence of works councils has a significant impact on the differences between the first and fifth as well as between the fifth and ninth quantiles for women and men. The differences in coefficients [with t-values in brackets] for men (women) are: -0.02 [15.05](-0.07 [27.93]) for the difference between the first and fifth quantile and -0.04 [18.47] (-0.05 [19.12]) for the difference between the fifth and ninth quantile.

[13] Compare Appendix Table 4(b) with Table 2, Appendix Table 4(c) with Table 3, Appendix Table 4(d) with Table 4, or Appendix Table 4(e) with Table 5. Full results are available from the authors on request.

References

Alda, Holger. 2005. *"*Datenbeschreibung der Version 1.1 des LIAB Querschnittmodells." FDZ Datenreport 2/2005, Nürnberg.

Addison, John T., Kornelius Kraft, and Joachim Wagner. 1993. "German Works Councils and Firm Performance." In Bruce E. Kaufman and Morris M. Kleiner (eds.), *Employee Representation: Alternatives and Future Directions*. Madison, WI: Industrial Relations Research Association, pp. 305-336.

Addison, John T., Claus Schnabel, and Joachim Wagner. 1997. "On the Determinants of Mandatory Works Councils in Germany." *Industrial Relations* 36 (October): 419-445.

Addison, John T., Claus Schnabel, and Joachim Wagner. 2001. "Works Councils in Germany: Their Effects on Firm Performance." *Oxford Economic Papers* 53 (October): 659-694.

Addison, John T., Lutz Bellmann, Claus Schnabel, and Joachim Wagner. 2004a. "The Reform of the German Works Constitution Act: A Critical Appraisal." *Industrial Relations* 43 (April): 392-420.

Addison, John T., Claus Schnabel, and Joachim Wagner. 2004b. "The Course of Research into the Economic Consequences of German Works Councils." *British Journal of Industrial Relations* 42 (June): 255-281.

Addison, John T., Claus Schnabel, and Joachim Wagner. 2007. "The (Parlous) State of German Unions." *Journal of Labor Research* 28 (Winter): 3-18.

Addison, John T. and Paulino Teixeira. 2006. "The Effect of Works Councils on Employment Change." *Industrial Relations* 45 (January): 1-25.

Bellmann, Lutz and Susanne Kohaut. 1995. "Effektiv- und Tariflöhne in der Bundesrepublik Deutschland: Eine empirische Analyse auf der Basis des IAB-Betriebspanels." In Knut Gerlach and Ronald Schettkat (eds.), *Determinanten der Lohnbildung*. Berlin: Editions Sigma: 72-93.

Card, David and Sara de la Rica. 2006. "The Effects of Firm-Level Contracts on the Structure of Wages: Evidence from Matched Employer-Employee Data." *Industrial and Labor Relations Review* 59 (July): 573-592.

Fitzenberger, Bernd. 1999. *Wages and Unemployment Across Skill Groups: An Analysis for West Germany*, ZEW Economic Studies 6, Springer: Heidelberg.

FitzRoy, Felix R. and Kornelius Kraft. 1985. "Unionization, Wages and Efficiency – Theories and Evidence from the U.S. and West Germany." *Kyklos* 38 (4): 537-554.

Farber, Henry S. 1994. "The Analysis of Interfirm Worker Mobility." *Journal of Labor Economics* 12(October): 554-593.

Freeman, Richard B. (1980). "The Exit-Voice Tradeoff in the Labor Market: Unionism, Job Tenure, Quits, and Separations." *Quarterly Journal of Economics* 94 (June): 643-673.

Freeman, Richard B. and Edward P. Lazear (1995). "An Economic Analysis of Works Councils." In Joel Rogers and Wolfgang Streeck (eds.), *Works Councils: Consultation, Representation, and Cooperation in Industrial Relations*. Chicago, IL: University of Chicago Press: 27-50.

Freeman, Richard B. and James L. Medoff (1984). *What Do Unions Do?* New York: Basic Books.

Gartner, Hermann and Gesine Stephan. 2004. "How Collective Contracts and Works Councils Reduce the Gender Wage Gap." IAB Discussion Paper 7/2004. Nürnberg: Institut für Arbeitsmarkt- und Berufsforschung der Bundesagentur für Arbeit

Gürtzgen, Nicole. 2006. "Rent-Sharing and Collective Wage Contracts – Evidence from German Establishment-Level Data." Unpublished paper, Zentrum für Europäische Wirtschaftsforschung/ZEW.

Hassel, Anke, 1999, "The Erosion of the German System of Industrial Relations." *British Journal of Industrial Relations* 37 (September): 438-505.

Horn, Henrik and Lars Svensson, 1986. "Trade Unions and Optimal Labor Contracts." *Economic Journal* 96 (June): 323-341.

Hübler, Olaf and Uwe Jirjahn. 2003. "Works Councils and Collective Bargaining in Germany: The Impact on Productivity and Wages." *Scottish Journal of Political Economy* 50 (September): 471-491.

Juhn, Chinhui, Kevin M. Murphy, and Bruce Pierce. 1993. "Wage Inequality and the Rise in Returns to Skill." *Journal of Political Economy* 101 (June): 410-442.

Kohaut, Susanne, and Claus Schnabel, 2003, "Zur Erosion des Flächentarifvertrags: Ausma_, Einflussfaktoren und Gegenma_nahmen," *Industrielle Beziehungen* 10: 193-219.

Kölling, Arnd. 2000. "The IAB Establishment Panel." *Schmollers Jahrbuch* 120: 291-300.

Kölling, Arndt, Claus Schnabel, and Joachim Wagner. 2005. "Establishment Age and Wages: Evidence from German Linked Employer-Employee Data." In Lutz Bellmann, Olaf Hübler, Wolfgang Meyer, and Gesine Stephan (eds.), *Institutionen, Löhne und Beschäftigung*. Nürnberg: Institut für Arbeitsmarkt- und Berufsforschung der Bundesagentur für Arbeit: 81-99.

Lazear, Edward. 1995. *Personnel Economics*. Cambridge, MA: MIT Press.

Meyer, Wolfgang. 1995a. "Tarifbindung – Ein Hemnis auf dem Weg zu niedrigeren Lohnkosten?" In Ulrich Schasse and Joachim Wagner (eds.), *Erfolgreiche Produzieren in Niedersachsen*. Hannover: Niedersächsisches Institut für Wirtschaftsforschung: 125-143.

Meyer, Wolfgang. 1995b. "Analyse der Bestimmungsfaktoren der übertarifliche Entlohnung.' In Knut Gerlach and Ronald Schettkat (eds.), *Derterminanten der Lohnbildung*. Berlin: Editions Sigma: 50-71.

Müller-Jentsch, Walter. 1995. "Germany: From Collective Voice to Co-Management." In Joel Rogers and Wolfgang Streeck (eds.), *Works Councils – Consultation, Representation and Cooperation in Industrial Relations*. Chicago, IL: Chicago University Press: 53-78.

Muysken, Joan and Thomas Zwick. 2006. "Wage Divergence and Unemployment: The Impact of Wage Setting Power and Training Costs." *Schmollers Jahrbuch* 126 (1): 1-19.

Siebert, Horst. 1997. "Labor Market Rigidities: At the Root of Unemployment in Europe." *Journal of Economic Perspectives* 11 (Summer): 37-54.

Stephan, Gesine and Knut Gerlach. 2005. "Wage Settlements and Wage Setting: Results from a Multi-Level Model." *Applied Economics* 37 (November): 2297-2306.

Table 1: Descriptive Statistics (Individual Level)

Variable	Sample				
	All workers	Workers in establishments with works councils	Workers in establishments without works councils	Males	Females
(log) Wages	4.542 (0.410)	4.591 (0.373)	4.131 (0.477)	4.609 (0.387)	4.369 (0.420)
Tenure (in years)	9.806 (8.717)	10.017 (8.125)	5.224 (5.944)	10.120 (8.282)	7.917 (7.126)
Age (years)	40.924 (10.024)	41.019 (9.946)	39.977 (10.556)	41.405 (9.884)	39.696 (10.273)
Fraction female	0.28	0.27	0.34		
Fraction in western Germany	0.79	0.82	0.54	0.83	0.70
Fraction foreign	0.08	0.09	0.05	0.09	0.06
Distribution by skill level:					
Unskilled blue collar	0.25	0.26	0.24	0.27	0.21
Low skilled blue collar	0.25	0.23	0.34	0.33	0.07
Highly skilled blue collar	0.02	0.02	0.02	0.02	0.00
White collar	0.48	0.49	0.40	0.38	0.72
Distribution by establishment size:					
5-19	0.01	0.00	0.12	0.01	0.02
20-99	0.08	0.04	0.41	0.07	0.08
100-249	0.11	0.09	0.24	0.10	0.11
250-499	0.13	0.13	0.13	0.13	0.15
500-999	0.18	0.19	0.07	0.16	0.21
≥1000	0.49	0.55	0.02	0.52	0.42
Distribution by schooling level:					
Seceduc1	0.13	0.14	0.11	0.13	0.14
Seceduc2	0.64	0.64	0.66	0.64	0.63
Terteduc1	0.01	0.01	0.01	0.01	0.01
Terteduc2	0.05	0.05	0.03	0.04	0.08
Polytechnic	0.05	0.05	0.03	0.05	0.03
University	0.08	0.08	0.04	0.08	0.07
Fraction covered by collective agreement:					
at sector level	0.73	0.78	0.35	0.73	0.73
at establishment level	0.15	0.16	0.07	0.16	0.12
High profits	0.31	0.31	0.33	0.33	0.26
Modern technical equipment	0.75	0.75	0.72	0.74	0.75
Overtime supplement	22.58	22.69	21.25	25.31	15.58
Export	0.43	0.44	0.29	0.48	0.29
Fraction covered by works councils	0.90			0.91	0.88
Number of observations	1,344,656	1,171,597	130,811	966,762	377,894

Notes: A description of the variables is provided in Appendix Table 1. Standard deviations are in parenthesis

Source: LIAB Wave 2001.

Table 2: The Determinants of (Log) Wages, All Workers

	(1)	(2)	(3)	(4)
Works council	0.460 (0.019)	0.132 (0.011)	0.111 (0.010)	0.114 (0.010)
Worker characteristics:				
Gender (female)		-0.204 (0.005)	-0.183 (0.003)	-0.182 (0.003)
Tenure (in years)		0.014 (0.001)	0.014 (0.001)	0.014 (0.000)
Tenure^2		-0.000 (0.000)	-0.000 0.000)	-0.000 (0.000)
Age		0.031 (0.001)	0.031 (0.001)	0.031 (0.001)
Age^2		-0.000 (0.000)	-0.000 0.000)	-0.000 (0.000)
Seceduc2		0.058 (0.006)	0.058 (0.005)	0.057 (0.005)
Terteduc1		0.048 (0.020)	0.033 (0.019)	0.032 (0.020)
Terteduc2		0.131 (0.008)	0.127 (0.007)	0.124 (0.007)
Polytechnic		0.276 (0.008)	0.272 (0.008)	0.270 (0.007)
University		0.420 (0.011)	0.413 (0.011)	0.411 (0.011)
Unskilled blue collar		-0.067 (0.007)	-0.073 (0.005)	-0.075 (0.005)
Highly skilled blue collar		0.276 (0.009)	0.258 (0.008)	0.259 (0.008)
White collar		0.276 (0.006)	0.234 (0.005)	0.236 (0.005)
Foreigner		-0.006 (0.004)	-0.010 0.004	-0.013 0.0041
Establishment characteristics:				
western Germany		0.231 (0.008)	0.195 0.008	0.192 0.008
size20_99		0.036 (0.153)	0.028 (0.014)	0.027 (0.014)
size100_249		0.049 (0.017)	0.041 (0.016)	0.038 (0.016)
size250_499		0.072 (0.018)	0.065 (0.017)	0.061 (0.017)
size500_999		0.112 (0.018)	0.104 (0.017)	0.098 (0.017)
size1000		0.159 (0.019)	0.145 (0.018)	0.111 (0.018)
Collective agreement:				
at sector level		0.054 (0.010)	0.055 (0.009)	0.052 (0.009)
at establishment level		0.062 (0.014)	0.061 (0.013)	0.056 (0.013)
Payment above coll. agreement		0.027 (0.008)	0.025 (0.007)	0.025 (0.007)
High profits		0.014 (0.008)	0.017 (0.008)	0.021 (0.007)
Modern technical equipment		0.008 (0.008)	0.002 (0.008)	-0.001 0.008
Overtime supplement		0.001 (0.000)	0.001 (0.000)	0.001 (0.000)
Export		-0.002 (0. 012)	-0.003 (0.011)	0.005 (0.009)
Establishment-average worker characteristics:				
Average female			-0.233 (0.026)	-0.225 (0.025)
Average age			0.001 (0.001)	-0.000 (0.001)
Average unskilled blue collar			-0.772 (0.063)	-0.801 (0.068)
Average low skilled blue collar			-0.842 (0.064)	-0.892 (0.069)
Average highly skilled b-collar			-0.606 (0.092)	-0.706 (0.111)
Average white collar			-0.575 (0.063)	-0.609 (0.068)
Average foreigners			0.069 (0.043)	0.031 (0.038)
Propensity score				0.002 (0.0005)
R^2	0.11	0.61	0.62	0.63
F	612.03	999.16	1,317.51	1,345.75
N	1,293,969	1,269,599	1,269,599	1,248,506
Number of establishments	8,197	8,178	8,178	8,131

Notes: Dependent variable: log wages. Standard errors are in parentheses and are adjusted for clustering at the establishment level and are heterogeneity robust. Model specifications are given by equations (1) through (3) in the text. The model includes industry dummies in addition to the arguments shown in the table.

Table 3: The Determinants of Log Wages by Gender

	Males	Females
Works council	0.088 (0.010)	0.153 (0.014)
Worker characteristics:		
Tenure (in years)	0.014 (0.0001)	0.015 (0.001)
Age	0.028 (0.001)	0.036 (0.002)
Age^2	-0.0003 (0.000)	-0.000 (0.000)
Seceduc2	0.056 (0.005)	0.057 (0.008)
Terteduc1	0.062 (0.017)	-0.019 (0.031)
Terteduc2	0.123 (0.008)	0.128 (0.009)
Polytechnic	0.267 (0.008)	0.260 (0.011)
University	0.410 (0.010)	0.431 (0.014)
Unskilled blue collar	-0.077 (0.005)	-0.079 (0.008)
Highly skilled blue collar	0.260 (0.008)	0.259 (0.020)
White collar	0.253 (0.005)	0.187 (0.008)
Foreigner	-0.014 (0.005)	-0.008 (0.004)
Establishment characteristics:		
western Germany	0.231 (0.008)	0.144 (0.009)
size20_99	0.027 (0.008)	0.018 (0.031)
size100_249	0.037 (0.011)	0.033 (0.031)
size250_499	0.059 (0.012)	0.058 (0.033)
size500_999	0.092 (0.013)	0.100 (0.032)
size1000	0.101 (0.014)	0.116 (0.034)
Collective agreement		
at sector level	0.049 (0.010)	0.055 (0.011)
at establishment level	0.061 (0.013)	0.046 (0.017)
Payment above collective agreement	0.020 (0.008)	0.024 (0.010)
High profits	0.024 (0.007)	0.016 (0.010)
Modern technical equipment	0.009 (0.007)	-0.015 (0.010)
Overtime supplement	0.001 (0.000)	0.001 (0.000)
Export	-0.004 (0.008)	0.023 (0.012)
Establishment-average worker characteristics:		
Average female	-0.211 (0.234)	-0.219 (0.031)
Average age	-0.001 (0.001)	0.002 (0.002)
Average unskilled blue collar	-0.781 (0.065)	-0.907 (0.161)
Average low skilled blue collar	-0.857 (0.065)	-1.034 (0.163)
Average highly skilled blue collar	-0.609 (0.108)	-0.889 (0.184)
Average white collar	-0.614 (0.065)	-0.670 (0.160)
Average foreigners	-0.211 (0.024)	-0.022 (0.085)
Propensity score	0.002 (0.000)	0.004 (0.001)
R^2	0.64	0.54
F	1056.26	421.24
N	895,957	352,549
Number of establishments	7,581	7,399

Note: see Notes to Table 2.

Table 4: The Determinants of (Log) Wages by Schooling Level

	Seceduc1	Seceduc2	Terteduc1	Terteduc2
Works council	0.112 (0.021)	0.123 (0.012)	0.195 (0.093)	0.055 (0.015)
Worker characteristics:				
Gender (female)	-0.133 (0.001)	-0.185(0.003)	-0.167 (0.012)	-0.139 (0.005)
Tenure (in years)	0.011 (0.001)	0.011(0.001)	0.024 (0.003)	0.009 (0.001)
$Tenure^2$	-0.000 (0.000)	-0.000 (0.000)	-0.001 (0.000)	-0.000 (0.000)
Age	0.026 (0.002)	0.261 (0.001)	0.103 (0.008)	0.068 (0.002)
Age^2	-0.000 (0.000)	-0.000 (0.000)	-0.001 (0.000)	-0.000 (0.000)
Unskilled blue collar	-0.065 (0.007)	-0.072 (0.005)	-0.013 (0.027)	-0.065 (0.012)
Highly skilled blue collar	0.263 (0.035)	0.269 (0.008)	0.164 (0.057)	0.234 (0.012)
White collar	0.149 (0.013)	0.228 (0.004)	0.333 (0.025)	0.290 (0.009)
Foreigner	0.008 (0.004)	-0.009 (0.003)	-0.046 (0.022)	-0.021 (0.009)
Establishment characteristics:				
western Germany	0.178 (0.019)	0.187 (0.008)	0.090 (0.049)	0.174 (0.011)
size20_99	-0.010 (0.019)	0.039 (0.008)	0.025 (0.079)	0.097 (0.025)
size100_249	-0.024 (0.022)	0.052 (0.011)	-0.020 (0.096)	0.121 (0.026)
size250_499	0.057 (0.025)	0.070(0.014)	0.019 (0.116)	0.141 (0.027)
size500_999	0.093 (0.024)	0.110 (0.014)	0.054 (0.103)	0.167 (0.026)
size1000	0.105 (0.025)	0.123 (0.015)	0.086 (0.109)	0.190 (0.028)
Collective agreement:				
at sector level	0.062 (0.014)	0.061 (0.010)	0.111 (0.069)	0.050 (0.014)
at establishment level	0.087 (0.018)	0.065 (0.014)	0.129 (0.074)	0.107 (0.020)
Payment above collective agreement	0.005 (0.010)	0.024 (0.008)	-0.006 (0.023)	0.035 (0.009)
High profits	0.038 (0.010)	0.024 (0.008)	-0.010 (0.025)	0.019 (0.010)
Modern technical equipment	0.022 (0.010)	-0.005 (0.008)	0.062 (0.033)	-0.015 (0.011)
Overtime supplement	0.001 (0.000)	0.001 (0.000)	0.000 (0.000)	0.001 (0.000)
Export	-0.027 (0.010)	0.006 (0.009)	0.013 (0.038)	0.006 (0.013)
Establishment-average worker characteristics:				
Average female	-0.296 (0.031)	-0.225 (0.023)	-0.247 (0.092)	-0.140 (0.031)
Average age	0.006 (0.002)	0.000 (0.001)	0.005 (0.005)	-0.001 (0.002)
Average unskilled blue collar	-5.684 (7.300)	-0.570 (0.313)	-4.848 (15.278)	-0.430 (0.305)
Average low skilled blue collar	-5.770 (7.301)	-0.663 (0.313)	-4.848(15.276)	-0.520 (0.306)
Average highly skilled blue collar	-5.935 (7.301)	-0.423 (0.324)	-4.909(15.278)	-0.136 (0.319)
Average white collar	-5.555 (7.300)	-0.381 (0.312)	-4.617(15.276)	-0.244 (0.305)
Average foreigners	0.044 (0.037)	0.068 (0.036)	0.367 (0.156)	0.211 (0.063)
Propensity score	0.002 (0.000)	0.003 (0.000)	0.000 (0.002)	0.002 (0.000)
R^2	0.54	0.60	0.51	0.51
F	176.8	798.79	62.98	356.87
N	167,520	796,984	9,915	63,873
Number of establishments	4,221	7,719	1,632	3,723

Note: see Table 2.

Table 4 (cont.): The Determinants of (Log) Wages by Schooling Level

	Polytechnic	University
Works council	0.115 (0.015)	0.087 (0.025)
Worker characteristics:		
Gender (female)	-0.150 (0.005)	-0.123 (0.004)
Tenure (in years)	0.013 (0.001)	0.020 (0.001)
$Tenure^2$	-0.000 (0.000)	-0.000 (0.000)
Age	0.053 (0.002)	0.055 (0.003)
Age^2	-0.001 (0.000)	-0.001 (0.000)
Unskilled blue collar	-0.106 (0.025)	-0.174 (0.027)
Highly skilled blue collar	0.276 (0.020)	0.401 (0.036)
White collar	0.423 (0.015)	0.551 (0.019)
Foreigner	-0.023 (0.010)	-0.071 (0.007)
Establishment characteristics:		
western Germany	0.275 (0.012)	0.234 (0.011)
size20-99	-0.064 (0.026)	0.022 (0.045)
size100-249	-0.087 (0.027)	0.061 (0.046)
size250_499	0.112 (0.028)	0.103 (0.047)
size500_999	0.127 (0.028)	0.136 (0.047)
size1000	0.121 (0.028)	0.150 (0.047)
Collective agreement:		
at sector level	0.052 (0.013)	0.057 (0.015)
at establishment level	0.034 (0.016)	0.038 (0.019)
Payment above collective agreement	0.027 (0.010)	0.032 (0.010)
High profits	0.009 (0.007)	0.014 (0.008)
Modern technical equipment	0.023 (0.009)	0.016 (0.009)
Overtime supplement	0.001 (0.000)	0.001 (0.000)
Export	0.010 (0.009)	0.015 (0.011)
Establishment-average worker characteristics:		
Average female	-0.141 (0.030)	-0.062 (0.031)
Average age	-0.004 (0.002)	-0.003 (0.002)
Average unskilled blue collar	0.515 (0.732)	-0.516 (0.322)
Average low skilled blue collar	0.500 (0.732)	-0.608 (0.322)
Average highly skilled blue collar	0.707 (0.738)	-0.431 (0.355)
Average white collar	0.653 (0.731)	-0.366 (0.323)
Average foreigners	0.223 (0.051)	0.216 (0.062)
Propensity score	0.002 (0.000)	0.001 (0.000)
R^2	0.55	0.45
F	373.58	351.97
N	56,920	97,309
Number of establishments	3,499	3,554

Note: See Notes to Table 2.

Table 5: Quantile (Log) Wage Regressions by Works Council Coverage and Gender

	Quantiles			
	0.20	0.40	0.60	0.80
Complete Sample:				
Works council	0.140 (0.001)	0.122 (0.001)	0.104 (0.001)	0.086 (0.001)
Collective agreement at sector level	0.071 (0.001)	0.058 (0.001)	0.050 (0.001)	0.038 (0.001)
Collective agreement at establishment level	0.077 (0.001)	0.075 (0.001)	0.070 (0.001)	0.060 (0.001)
Pseudo- R^2	0.43	0.42	0.43	0.44
Males:				
Works council	0.110 (0.001)	0.096 (0.001)	0.080 (0.001)	0.067 (0.001)
Collective agreement at sector level	0.067 (0.001)	0.056 (0.001)	0.047 (0.001)	0.033 (0.001)
Collective agreement at establishment level	0.080 (0.001)	0.079 (0.001)	0.072 (0.002)	0.059 (0.001)
Pseudo- R^2	0.44	0.43	0.44	0.45
Females:				
Works council	0.189 (0.002)	0.174 (0.002)	0.145 (0.002)	0.120 (0.002)
Collective agreement at sector level	0.073 (0.002)	0.058 (0.001)	0.047 (0.001)	0.041 (0.002)
Collective agreement at establishment level	0.064 (0.002)	0.059 (0.002)	0.056 (0.002)	0.058 (0.002)
Pseudo- R^2	0.38	0.37	0.37	0.38

Notes: Dependent variable: log wages. Standard errors are in parentheses. Model specifications are given by equations (1) through (3) in the text. The mode uses the covariates shown in column (4) of Table 2.

Table 6: The Determinants of Tenure

	All workers		Males		Females	
	(1)	(2)	(3)	(4)	(5)	(6)
Works council	1.566 (0.230)	-2.873 (1.903)	1.538 (0.270)	-3.101 (2.244)	1.519 (0.245)	0.037 (2.209)
Predicted (log) wage*works council	-	1.064 (0.453)	-	1.086 (0.526)	-	0.372 (0.561)
Worker characteristics:						
Gender (female)	-0.521 (0.101)	-0.251 (0.135)				
Seceduc2	-0.233 (0.203)	-0.242 (0.203)	-0.163 (0.237)	-0.169 (0.236)	-0.794 (0.181)	-0.799 (0.182)
Terteduc1	-2.927 (0.326)	-2.771 (0.330)	-3.232 (0.390)	-3.063 (0.399)	-2.607 (0.249)	-2.557 (0.258)
Terteduc2	-2.387 (0.394)	-2.521 (0.403)	-2.615 (0.519)	-2.748 (0.527)	-2.539 (0.239)	-2.588 (0.253)
Polytechnic	-3.440 (0.315)	-3.676 (0.346)	-3.606 (0.353)	-3.840 (0.386)	-3.194 (0.267)	-3.272 (0.293)
University	-4.136 (0.375)	-4.516 (0.435)	-4.319 (0.418)	-4.698 (0.490)	-3.784 (0.323)	-3.915 (0.373)
Unskilled b-c	-1.240 (0.098)	-1.125 (0.285)	-1.175 (0.323)	-1.056 (0.312)	-0.811 (0.224)	-0.765 (0.219)
Highly skilled b-c	1.200 (0.512)	0.910 (0.498)	1.014 (0.488)	0.716 (0.485)	2.000 (0.495)	1.924 (0.502)
White collar	0.022 (0.210)	-0.249 (0.241)	-0.084 (0.226)	-0.371 (0.253)	0.764 (0.196)	0.684 (0.238)
Foreigner	-0.322 (0.193)	-0.280 (0.193)	-0.332 (0.215)	-0.290 (0.215)	-0.395 (0.209)	-0.379 (0.209)
Establishment characteristics:						
western Germany	3.881 (0.269)	3.620 (0.257)	4.182 (0.327)	3.919 (0.324)	3.112 (0.219)	3.019 (0.222)
size20_99	-0.605 (0.304)	-0.587 (0.309)	-0.212 (0.235)	-0.174 (0.236)	-1.078 (0.360)	-1.090 (0.363)
size100_249	-0.583 (0.359)	-0.592 (0.364)	-0.172 (0.321)	-0.150 (0.322)	-1.001 (0.396)	-1.027 (0.400)
size250_499	-0.254 (0.377)	-0.243 (0.382)	0.167 (0.354)	0.212 (0.354)	-0.764 (0.407)	-0.783 (0.411)
size500_999	0.258 (0.404)	0.185 (0.411)	0.699 (0.394)	0.655 (0.401)	-0.314 (0.419)	-0.361 (0.430)
size1000	1.664 (0.550)	1.547 (0.545)	2.450 (0.583)	2.361 (0.401)	0.172 (0.493)	0.111 (0.430)
High profits	0.411 (0.409)	0.388 (0.410)	0.625 (0.454)	0.604 (0.455)	-0.264 (0.317)	-0.273 (0.316)
Modern tech equip.	-0.508 (0.415)	-0.557 (0.411)	-0.711 (0.471)	-0.760 (0.465)	0.080 (0.323)	0.062 (0.319)
Overtime suppl.	-0.001 (0.008)	-0.001 (0.008)	-0.002 (0.008)	-0.003 (0.008)	0.001 (0.008)	0.001 (0.007)
Export	-0.895 (0.655)	-0.949 (0.653)	-1.007 (0.692)	-1.007 (0.692)	-0.295 (0.510)	-0.311 (0.509)
Coll. agreement:						
at sector level	0.431 (0.282)	0.419 (0.282)	0.308 (0.361)	0.329 (0.384)	0.637 (0.209)	0.632 (0.210)
at estab. level	0.980 (0.572)	0.983 (0.572)	0.938 (0.625)	0.989 (0.673)	0.838 (0.504)	0.842 (0.504)
Payment above collective agreement	0.197 (0.583)	0.134 (0.585)	0.345 (0.709)	0.300 (0.763)	-0.200 (0.338)	-0.226 (0.338)
R^2	0.35	0.35	0.36	0.36	0.30	0.30
F	77.75	81.33	64.78	68.90	66.42	67.35
N	1,277,903	1,277,903	916,584	916,584	361,319	361,319
Number of establishments	8,182	8,182	7,621	7,621	7,455	7,455

Notes: Model specifications are given by equations (4) and (5) in the text. Dependent variable: tenure in years. Standard errors (clustered by establishment and heterogeneity robust) are in parentheses. The model includes industry dummies. Dummies for each year of age were also included in the specification.

Table 6A: The Determinants of Tenure; Quantile Regressions (All Workers)

Quantile	Works council (Model without interaction term)	Interaction term (Model with works council variable and interaction term)
0.2	1.28 (0.013)	-0.84 (0.024)
0.4	1.56 (0.029)	0.60 (0.059)
0.6	1.32 (0.029)	2.64 (0.066)
0.8	1.02 (0.029)	2.98 (0.073)

Note: See Table 6.

Table 7: The Determinants of Tenure: The Freeman/Medoff Tenure Model (All Workers)

	Coefficient (s.e.)
(log) Wage	0.645 (0.029)
Works council	0.384 (0.044)
Worker characteristics:	
Gender (female)	0.193 (0.015)
Age	0.045 (0.001)
Unskilled blue collar	-0.172 (0.034)
Highly skilled blue collar	-0.093 (0.045)
White collar	-0.454 (0.027)
Foreigner	-0.100 (0.026)
Establishment characteristics:	
western Germany	-0.027 (0.038)
size20_99	-0.214 (0.054)
size100_249	-0.286 (0.062)
size250_499	-0.277 (0.066)
size500_999	-0.246 (0.071)
size1000	-0.102 (0.078)
Collective agreement at sector level at establishment level	 0.112 (0.041) 0.133 (0.073)
Payment above collective agreement	-0.032 (0.068)
High profits	0.023 (0.047)
Modern technical equipment	-0.046 (0.049)
Overtime supplement	-0.000 (0.049)
Export	-0.036 (0.069)
R^2	0.26
F	200.31
N	1,269,599
Number of establishments	8,178

Notes: Dependent variable: (log) tenure in years. OLS regressions, standard errors (clustered by establishment and heterogeneity robust) are in parentheses. The model includes industry dummies.

Appendix Table 1: Description of Variables

Variable	Definition
(a)	
Wages	Daily (log) gross wage (in DM). Information on wages in the administrative data is right censored at the upper earnings limit for social security contributions. For such individuals, the predicted wage was obtained using separate Tobit regressions of the daily wage on tenure, tenure square, skill category, plant location (western vs. eastern Germany) and industry dummies. These separate Tobit regressions were defined according to gender, education level, and nationality, in a total of 20 different cells.
Gender	Dummy: 1 if worker is female, 0 otherwise.
Tenure	Job tenure at the current establishment (in years). Number of days since beginning work at the current establishment.
Employee skill groups	Employees in the raw administrative records were classified into four groups: three blue-collar worker categories (comprising the unskilled, low skilled, and highly skilled) and one aggregate white-collar category made up of all white-collar grades. The residual categories of home-workers, part-time workers, and apprentices were dropped from the sample.
Foreigner	Dummy: 1 if worker has a non-German nationality, 0 otherwise.
Employee schooling groups	Employees in the raw administrative records were classified into six categories according to their education level: Seceduc1 (individuals without a completed apprenticeship and without an Abitur), Seceduc2 (individuals with a completed apprenticeship and without an Abitur), Terteduc1 (individuals without a completed apprenticeship and with an Abitur), Terteduc2 (individuals with a completed apprenticeship and with an Abitur), Polytechnic (individuals with a Polytechnic degree), and University (individuals with an University degree).
(b)	
Works council	Dummy: 1 if works council is present, 0 otherwise.
Western Germany	Dummy: 1 if the establishment is in western Germany, 0 otherwise.
High profits	Dummy: 1 if the establishment reports a "good profit situation in 2001", 0 otherwise.
Collective agreement	Dummy: 1 if the establishment is covered by a collective agreement, 0 otherwise.
Payment above collective agreement	Dummy: 1 if payment is above collective bargaining tariff, 0 otherwise.
Modern technical equipment	Modern technology dummy: 1 if the plant's equipment is either state-of-the art or up-to-date compared with other firms in the same industry, 0 otherwise.
Overtime supplement	Share of employees who receive paid overtime hours.
Export	Dummy: 1 if the percentage share of exports in the establishment's annual turnover is greater than zero, 0 otherwise.
Size20_99	Dummy: 1 if the number of employees is between 19 and 99, 0 otherwise.
Size100_249	Dummy: 1 if the number of employees is between 99 and 250, 0 otherwise.
Size250_499	Dummy: 1 if the number of employees is between 249 and 500, 0 otherwise.
Size500_999	Dummy: 1 if the number of employees is between 499 and 1,000, 0 otherwise.
Size1000	Dummy: 1 if the number of employees is greater than 999, 0 otherwise.

Notes: Variables in panel *(a)* were extracted from the Employment Statistics Register, while those in panel *(b)* were taken from the IAB Employer Survey. See text, section IV.

Appendix Table 2: Descriptive Statistics (Establishment Level)

Variable	Sample				
	All establishments	Establishments with works councils	Establishments without works councils	Males	Females
(log) Wages	4.227 (0.474)	4.417 (0.399)	4.064 (0.459)	4.327 (0.427)	4.060 (0.500)
Tenure (in years)	6.831 (6.843)	8.401 (7.642)	5.611 (5.900)	7.091 (7.170)	6.402 (6.246)
Age (years)	40.475 (10.450)	41.746 (10.224)	39.528 (10.552)	40.705 (10.342)	40.096 (10.617)
Fraction female	0.37	0.35	0.38		
Fraction in western Germany	0.62	0.69	0.56	0.62	0.61
Fraction foreign	0.05	0.05	0.04	0.05	0.04
Distribution by skill level:					
Unskilled blue collar	0.18	0.20	0.17	0.20	0.15
Low skilled blue collar	0.32	0.22	0.37	0.43	0.09
Highly skilled blue collar	0.02	0.02	0.02	0.03	0.04
White collar	0.48	0.54	0.42	0.34	0.72
Distribution by establishment size:					
5-19	0.32	0.06	0.52	0.30	0.36
20-99	0.35	0.30	0.38	0.36	0.33
100-249	0.14	0.24	0.07	0.15	0.13
250-499	0.09	0.17	0.02	0.09	0.08
500-999	0.06	0.12	0.01	0.06	0.06
≥1000	0.04	0.10	0.00	0.04	0.04
Distribution by schooling level:					
Seceduc1	0.10	0.12	0.08	0.09	0.09
Seceduc2	0.67	0.67	0.68	0.68	0.66
Terteduc1	0.01	0.01	0.00	0.01	0.01
Terteduc2	0.04	0.05	0.03	0.03	0.05
Polytechnic	0.03	0.05	0.03	0.04	0.03
University	0.05	0.07	0.03	0.05	0.05
Fraction covered by collective agreement:					
at sector level	0.53	0.71	0.39	0.54	0.51
at establishment level	0.08	0.13	0.05	0.08	0.09
High profits	0.26	0.24	0.28	0.27	0.25
Modern technical equipment	0.69	0.71	0.67	0.68	0.70
Overtime supplement	17.10	17.9	16.38	20.32	11.48
Export	0.23	0.32	0.16	0.28	0.16
Fraction covered by works councils	0.44			0.45	0.42
Number of observations	8,579	3,589	4,612	5,451	3,128

Notes: A description of the variables is provided in Appendix Table 1. Standard deviations are in parenthesis.
Source: LIAB Wave 2001.

Appendix Table 3: The Determinants of (Log) Wages, Including Interaction Terms between Works Councils and Selected Covariates

	Coefficient (s.e.)	Coefficient (s.e.)
Works council	0.055 (0.016)	0.106 (0.015)
Works council * Collective agreement (sector level)		-0.008 (0.018)
Works council * Collective agreement (estab. level)		0.113 (0.028)
Worker characteristics:		
Gender (female)	-0.270 (0.010)	-0.182 (0.003)
Tenure (in years)	0.014 (0.001)	0.014 (0.001)
$Tenure^2$	-0.000 (0.000)	-0.0003 (0.00001)
Age	0.031 (0.001)	0.031 (0.001)
Age^2	-0.000 (0.000)	-0.0003 (0.00001)
Seceduc2	0.028 (0.014)	0.057 (0.005)
Terteduc1	-0.171 (0.144)	0.03 (0.02)
Terteduc2	0.175 (0.016)	0.125 (0.007)
Polytechnic	0.238 (0.017)	0.270 (0.008)
University	0.372 (0.023)	0.411 (0.011)
Works council * Gender	0.098 (0.011)	
Works council * Seceduc2	0.035 (0.015)	
Works council * Terteduc1	0.221 (0.145)	
Works council * Terteduc2	-0.051 (0.017)	
Works council * Polytechnic	0.038 (0.017)	
Works council * University	0.045 (0.023)	
Unskilled blue collar	-0.074 (0.004)	-0.075 (0.005)
Highly skilled blue collar	0.258 (0.008)	0.259 (0.008)
White collar	0.236 (0.005)	0.236 (0.0048)
Foreigner	-0.012 (0.004)	-0.013 (0.004)
Establishment characteristics:		
western Germany	0.194 (0.008)	0.191 (0.008)
size20_99	0.025 (0.015)	0.029 (0.014)
size100_249	0.037 (0.016)	0.042 (0.016)
size250_499	0.061 (0.017)	0.066 (0.017)
size500_999	0.097 (0.017)	0.101 (0.017)
Size1000	0.111 (0.018)	0.115 (0.018)
Collective agreement		
at sector level	0.052 (0.009)	0.064 (0.014)
at establishment level	0.057 (0.013)	-0.047 (0.023)
Payment above collective agreement	0.025 (0.007)	0.026 (0.007)
High profits	0.021 (0.007)	0.021 (0.007)
Modern technical equipment	-0.001 (0.008)	-0.0006 (0.007)
Overtime supplement	0.001 (0.000)	0.0008 (0.0001)
Export	0.005 (0.009)	0.005 (0.009)
Establishment-average worker characteristics:		
Average female	-0.211 (0.026)	-0.225 (0.025)
Average age	0.000 (0.001)	0.0002 (0.001)
Average unskilled blue collar	-0.807 (0.068)	-0.802 (0.069)
Average low skilled blue collar	-0.896 (0.069)	-0.892 (0.070)
Average highly skilled blue collar	-0.693 (0.111)	-0.713 (0.111)
Average white collar	-0.618 (0.068)	-0.611 (0.069)
Average foreigners	0.033 (0.038)	0.0337 (0.038)
Propensity score	0.002 (0.000)	0.002 (0.0005)

R^2	0.63	0.63
F	1280.86	1309.17
N	1,248,506	1,248,506
Number of establishments	8,131	8,131

Note: See Table 2.

Appendix Table 4(a): Descriptive Statistics, Establishments with 21-100 Employees, (Individual Level)

Variable	All workers	Workers in establishments with works councils
(log) Wages	4.255 (0.444)	4.381 (0.396)
Tenure (in years)	6.570 (6.590)	7.450 (6.505)
Age (years)	41.048 (10.310)	42.201 10.116)
Fraction female	0.314	0.308
Distribution by skill level:		
Unskilled blue collar	0.189	0.168
Highly skilled blue collar	0.023	0.025
White collar	0.445	0.500
Foreigner	0.043	0.041
Collective agreement at sector level at establishment level	 0.489 0.089	 0.646 0.135
Payment above collective agreement	0.356	0.403
western Germany	0.570	0.611
High profits	0.284	0.238
Modern technical equipment	0.708	0.670
Overtime supplement	20.694	18.485
Export	0.278	0.287
Distribution by schooling level:		
Seceduc1	0.097	0.097
Seceduc2	0.672	0.680
Terteduc1	0.004	0.005
Terteduc2	0.032	0.037
Polytechnic	0.037	0.048
University	0.055	0.075
Fraction covered by works councils	0.457	

Appendix Table 4(b): The Determinants of (Log) Wages in Establishments with 21-100 Employees, Summary Results

	(1)	(2)	(3)	(4)
Works council	0.227 (0.014)	0.094 (0.009)	0.073 (0.009)	0.065 (0.009)
R^2	0.07	0.56	0.57	0.57
F	257.08	392.49	526.98	522.34
N	96,011	95,885	95,885	95,408
Number of establishments	2,754	2,751	2,751	2,737

Note: See Table 2

Appendix Table 4(c): The Determinants of (Log) Wages by Gender in Establishments with 21-100 Employees, Summary Results

	Males	Females
Works council	0.05 (0.009)	0.100 (0.013)
R^2	0.60	0.50
F	468.5	131.11
N	65,756	29,652
Number of establishments	2,671	2,607

Note: See Table 2

Appendix Table 4(d): The Determinants of (Log) Wages by Schooling Level in Establishments with 21-100 Employees, Summary Results

	Seceduc1	Seceduc2	Terteduc1	Terteduc2	Polytechnic	University
Works council	0.059 (0.016)	0.074 (0.010)	-0.057 (0.064)	0.031 (0.021)	0.058 (0.020)	0.044 (0.024)
R^2	0.54	0.56	0.54	0.45	0.49	0.36
F	74.75	374.90	13.17	54.86	50.32	36.30
N	9,204	64,268	434	3,131	3,601	5,284
Number of establishments	1,377	2,658	295	1,121	1,062	1,046

Notes: See Table 2

Appendix Table 4(e): Quantile (Log) Wage Regressions by Works Council Coverage and Gender in Establishments with 21-100 Employees, Summary Results

	Quantiles			
	0.20	0.40	0.60	0.80
Complete Sample: Works council	0.056 (0.002)	0.059 (0.002)	0.062 (0.002)	0.060 (0.003)
Males: Works council	0.044 (0.003)	0.048 (0.002)	0.051 (0.003)	0.052 (0.003)
Females: Works council	0.107 (0.005)	0.095 (0.005)	0.093 (0.004)	0.083 (0.005)

Note: See Table 5.

Appendix Table 4(f): The Determinants of Tenure [Card and de la Rica Model] in Establishments with 21-100 Employees, Summary Results

	All		Males		Females	
	(1)	(2)	(3)	(4)	(5)	(6)
Works council	0.823 (0.154)	-0.409 (1.481)	0.783 (0.182)	-1.551 (1.902)	0.915 (0.165)	1.048 (1.806)
Predicted (log) wage*works council	--	0.292 (0.364)		0.542 (0.456)		-0.033 (0.452)
R^2	0.23	0.23	0.24	0.24	0.21	0.21
F	52.08	52.08	39.40	39.49	41.23	40.72
N	96,524	96,524	66,307	66,607	30,217	30,217
Number of establishments	2,751	2,751	2,684	2,684	2,623	2,623

Note: See Table 6.

Appendix Table 4(g): Determinants of Tenure [Freeman/Medoff Tenure Model] in Establishments with 21-100 Employees, Summary Results

	Coefficient (s.e.)
(log) Wages	0.710 (0.034)
Works council	0.144 (0.032)
Gender (female)	0.286 (0.019)
R^2	0.210
F	142.00
N	97,264
Number of establishments	2,848

Note: See Table 7.