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GERMAN WORKS COUNCILS AND THE ANATOMY OF WAGES

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Data appendixes and computer programs used in the paper are available on request from the third author at zwick@zew.de.

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Abstract

This paper provides a comprehensive examination of the effect of German works councils on wages, using matched employer-employee data from the German LIAB for 2001. In general, we find that works councils are associated with higher earnings, even after accounting for worker and establishment heterogeneity. At this level, the works council premium exceeds the collective bargaining mark-up, and is modestly higher in the presence of collective bargaining once we account for worker selection into the two institutions. More specifically, works councils do seem to benefit women relatively and to build on collective bargaining in this regard. They also seem to favor foreign, east-German, and service-sector workers although the effects of collective bargaining are not always reinforcing. The evidence from quantile regressions suggests that only in conjunction with collective bargaining is the narrowing influence of works councils really clear-cut. The above findings pertain to workers in all plants. Once we consider smaller establishments with 21-100 employees, however, each of these results is further qualified, beginning with the effect on wage levels where premia are now only observed in conjunction with collective bargaining.

JEL Classification: J31, J50.

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

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 recent results for investment, 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 of the decision-making process, by way of explanation.

On closer inspection, however, the comparative neglect of wage determination can be traced to data limitations.[1] Typically, plant-level data sets used in the performance analyses referred to earlier only contain information on average wages, derived from information on the total wage bill and employment. A proper wage analysis requires the estimation of augmented Mincerian earnings functions on the basis of individual information, which also permit analysis of the wage distribution.

Progress has been made possible through the comparatively recent availability of linked employer-employee datasets. Not only can we now look at works council effects on wages holding constant human capital, demographic, and other individual (and plant) characteristics, but 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).

In the present paper, we deploy one such data set, namely, 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 conflation is a linked data set known as the LIAB.

Our treatment proceeds as follows. We first briefly describe the institutional setting. Against this backdrop, the still sparse literature on works councils and wages is next reviewed. Presentation of a formal model precedes discussion of our findings. These are organized by wage level (for all workers, and by collective bargaining coverage, gender, schooling level, region, sector, and nationality) and wage distribution (again for all workers, and by gender). All our regressions are then rerun for a subset of plants, namely, establishments with 21 to 100 employees. Among such plants works council powers are a datum, such that one aspect of works council heterogeneity is taken into account. Moreover, there is a more balanced representation of plants with and without works councils in this particular plant firmament. The threads of our empirical analysis, including some disparate results from the broad sensitivity test(s), are drawn together in a concluding section, which also contains some suggestions for further research.

The Institutional Setting: Works Councils, Collective Bargaining, and the Dual System of Industrial Relations

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 (in our sample, just 8 percent of plants have single-employer agreements) collective bargaining over wages and conditions is conducted outside the plant, typically at industry and regional level (in our sample 53 percent of plants).[2] 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).[3] Even abstracting from the subtle complication introduced by firms that are not parties to a sectoral collective wage agreement (or *Flächentarifvertrag*), 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. Although 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 just under 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.

Since our data pertain to 2001, and specifically capture the situation on June 30 of that year, it might be argued that the latest changes in the law which became effective on July 2001 might influence the results. This is unlikely because there are no obvious signs of changes in works council representation in the anticipated direction in the immediate wake of the legislation. That is to say the reforms have not stimulated the introduction of works councils (see Bellmann and Ellguth, 2006). The more fundamental changes that have occurred in yet more recent years would seem to apply to both collective bargaining and works councils alike as the dual system of industrial relations has come under threat (see Addison et al., 2007). In short, there is no suggestion that the results reported here for 2001 are contaminated by legislative changes.

Literature Review: Works Councils and Wages

As was noted earlier, there is comparatively little information on the effect of works councils on wages compared with their effects on firm performance. The literature on the impact of collective bargaining proper on wages is also sparse (see below).

Beginning with studies that focus on works councils, the early literature presents a mixed picture. 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.[4] 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 offer some clarification. 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*).[5] 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.[6]

Further differentiation is offered by the introduction of collective bargaining arguments proper and the extension of the wage argument. Using two waves of the *Hannoveraner Firmenpanel*, Hübler and Jirjahn (2003) offer a test of the Freeman-Lazear (1995) model that, where a council either coexists with or 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.[7] Interestingly, Hübler and Jirjahn report no evidence of an independent effect of collective bargaining on wages, which result 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 below). For their part, works councils are found to have a positive effect on wages, which outcome is more evident for the uncovered sample.[8] (They are also associated with a well-defined positive effect on productivity in the covered sector.)[9]

Rather stronger wage results are reported by Jirjahn (2003) using the 1994 and 1996 waves of the Hannoveraner Firmenpanel. His OLS estimates results point to a works council wage premium in the order of 8 to18 percent. And this mark-up is higher in establishments without collective bargaining. This study also uses average wage data, but unlike the previous study does not control for works council endogeneity.

In the only study using the Hannoveraner Firmenpanel to investigate skill differentials, Hübler and Meyer (2001) examine the determinants of differences between the highest effective wages of skilled and unskilled workers. Both industrial relations arguments are instrumented as in Hübler and Jirjahn (2003). The authors' OLS estimates suggest that works councils reduce and collective agreements increase the wage spread.

For their part, studies that examine the impact on wages of collective bargaining alone point to a positive effect of coverage.[10] Thus, for example, using the IAB Linked Employer-Employee data set for 1996, Kölling et al. (2005) find that

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 from the German Structure of Earnings Survey points to a positive premium for collective bargaining coverage. Specifically, over successive cross sections of the data they report evidence of a rising wage premium for the average covered worker: 4 percent in 1991, through 9 percent in 1995, to 12 percent in 2001.

The latest linked employer-employee studies examine both collective bargaining coverage and works council presence. Using LIAB data for the mining and manufacturing sector, Gürtzgen (2005) investigates the manner in which wages respond to rents (defined as value-added minus the opportunity cost of labor). She reports that rent sharing is unrelated to collective bargaining coverage once one accounts for unobserved individual and plant heterogeneity *and* the endogeneity of rents. These findings are consistent with those of Hübler and Jirjahn (2003), but the explanation is more specific: unions favor a compressed intra-industry wage structure and suppress the responsiveness of wages to firm-specific profitability considerations. Gürtzgen further reports a well-determined positive association between works councils and rent sharing in pooled OLS estimates. Works council presence increases wages by 11 to 15 percent. Although this effect falls to between 2 and 3 percent after controlling for unobserved individual and plant heterogeneity, it is still statistically significant and, further, survives the application of dynamic panel estimators. Finally, Gürtzgen also provides results for specific groups of workers. Her fixed-effect estimates suggest that collective bargaining at sectoral level reduces interfirm wage differentials for males and females and by skill group, but the works council effect on rents is positive for males, blue-collar workers, and medium- and high-skilled workers.[11]

In a follow-up paper, Gürtzgen (2006) estimates wage change models for individuals (and establishments) that change their collective bargaining status, using the LIAB data for 1995-2002, and confirms her earlier result that centralized bargaining has modest effects, now increasing wages by 2 percent on average. Her base pooled regression estimates point to positive *cet. par.* effects of sectoral collective bargaining of around 5 percent (10 percent) in western (eastern) Germany. Corresponding works council effects are 5 (13) percent. The interaction term between works councils and collective bargaining is positive and statistically significant. However, other interaction terms suggest that collective bargaining reduces the returns to skill and gender.

Allowing for the nonrandom selection of workers and firms into collective bargaining regimes yields only a very modest collective bargaining differential (for western Germany) and few signs that collective bargaining influences the returns to worker characteristics. As far as the interaction with works councils is concerned, however, there is evidence of a modest increase in the returns to works councils under collective bargaining (albeit only for western Germany alone).

The very latest treatments of collective bargaining of which we are aware seek to differentiate between union power, as measured by (net) union density, and actual bargaining outcomes as reflected in different regimes of collective bargaining coverage (two types of collective agreement and individual contracts). The upshot of these investigations by Fitzenberger et al. (2006, 2008) using the German Structure of Earnings Survey is not altogether transparent, partly because of the new element of individual bargaining in covered firms (i.e. where not all employees are covered). But the main results would seem to be as follows. First, greater collective bargaining coverage is associated with higher wage levels and reduced inequality. Second, given

coverage status, higher union density is associated with lower wage levels. This latter dispersion effect carries over to the uncovered sector in the sense that an increase in density lowers wages in the uncovered sector across the whole distribution presumably via a spillover effect. But note that there is no separate identification of a works council impact, while neither union argument is endogenized.

The implications of this literature review are fourfold. First and foremost, despite section 77 (3) of the Works Constitution Act, works councils may be expected to have some independent (positive) influence on wage levels, even if the manner of that influence along the skills continuum and the wage distribution is not transparent. Second, on the balance of the evidence, the influence of collective bargaining proper is altogether more clouded. Third, there is nonetheless the suggestion that collective bargaining may moderate or otherwise influence the wage effects of works councils. Fourth, and relatedly, it is inappropriate to treat the institutions of industrial relations as exogenous, notwithstanding the difficulty of accounting for their endogeneity.

Despite these pieces of evidence on the wage impact of works councils, a specific analysis of their impact for different worker groups, bargaining regimes, and wage quantiles is still lacking. This is the justification for the present treatment. Relatedly, we seek some improvement in approach. In this context, some cross-section approaches take into account the endogeneity of the institution and collective bargaining status in wage equations but they are not explicit in revealing the economic hypotheses behind the instruments used; indeed, frequently they do not mention which instruments are used or do not test the quality/viability of those instruments. For their part, the longitudinal approaches have the advantage of using internal instruments to tackle endogeneity. But longitudinal data is not a panacea in this regard. Potential problems stem from works council elections that take place only once every four years

and possible errors in data recording that works councils have ceased to exist outside of those years.

Methodology

Our starting point is the standard Mincerian earnings function in which individual (log) wages, y_i, are a function of (observed) individual productive characteristics, X_{1i}, to include both general and specific skills (proxied by schooling, tenure, and occupation), and control variables specific to establishments, $Z_{j(i)}$. In particular, we are interested in the specific role of the works council institution, $Woco_{j(i)}$, and whether a given establishment is covered by collective wage agreement, $Coll_{j(i)}$. In a compact manner, the basic model can be then specified as follows:

(1) $$y_i = X_{1i}B_1 + Z_{j(i)}B + Woco_{j(i)}\delta_1 + Coll_{j(i)}\delta_2 + e_i \quad .$$

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 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.[12] One way to control for heterogeneity bias is to assume that workers in the same workplace share some common (unobserved) characteristics. Adding establishment-average characteristics $X_{2j(i)}$ to equation (1) may enable us to control for a key source of contamination (after Card and De la Rica, 2006). Accordingly, we have

(2) $$y_i = X_{1i}B_1 + X_{2j(i)}B_2 + Z_{j(i)}B + Woco_{j(i)}\delta_1 + Coll_{j(i)}\delta_2 + u_i$$

where, X_{1i}, $X_{2j(i)}$, and $Z_{j(i)}$ denote the characteristics of workers, co-workers in the same establishment, and establishments, respectively, $Woco_{j(i)}$ again denotes the works council status of the establishment, and $Coll_{j(i)}$ flags whether the establishment is covered by collective wage agreement of any type.

Finally, there is the issue of self-selection of workers into establishments with (or without) a works council and with (or without) a collective agreement. The (testable) hypothesis here is that workers may choose a job based on establishment status with respect to either institution. Our preferred route to deal with this issue consists of using a bivariate probit approach in which the (two) worker choices are taken as interdependent. Using equation (2) above, this approach amounts to add two selectivity terms, one for each labor market institution**,** namely:

(3) $$y_i = X_{1i}B_1 + X_{2j(i)}B_2 + Z_{j(i)}B + Woco_{j(i)}\delta_1 + Coll_{j(i)}\delta_2 + \\ + \hat{\lambda}_i^{Woco}\delta_3 + \hat{\lambda}_i^{Coll}\delta_4 + u_i,$$

where $\hat{\lambda}_i^{Woco}$ and $\hat{\lambda}_i^{Coll}$ are the estimated inverse Mills' ratio terms obtained from running a bivariate probit in which the error terms of the choice models are assumed to be correlated. According to this procedure, we have the two models specified as follows:

(3') $Woco_i = 1$ if $Woco_i^* > 0$, $Woco_i = 0$ otherwise,

with $Woco_i^* = \Omega_{1i}\omega_1 + \varepsilon_{1i}$

and

(3'') $Coll_i = 1$ if $Coll_i^* > 0$, $Coll_i = 0$ otherwise,

with $Coll_i^* = \Omega_{2i}\omega_2 + \varepsilon_{2i}$.

As it is shown below, the null of no correlation between ε_1 and ε_2 is rejected by the data. (For completeness, we will also comment on the results for the case in which we assume that the two choices are taken as independent of each other. In an alternative and final check, we will consider the case where the collective bargaining variable can be one of two types of coverage: firm- or sectoral-level.) We note that although the two sets of right-hand-side variables in the works council and

collective bargaining equations, γ_1 and γ_2, need not to be different from the set of regressors in the earnings equation, we find a subset of variables that can be shown to be statistically significant in the choice equations but not in the earnings equation. The variables in this subset – flat hierarchies, teamwork, and autonomous work groups – are then used as instruments in our identification strategy. We show that these establishment organizational characteristics have no influence on individual wages but that there is a positive (negative) correlation between two (one) of these worker involvement practices initiated by the management and the institutions of worker representation "initiated" by the employees (i.e. the selection of workers into establishments with works councils and collective bargaining) (see also Zwick, 2004).

Team work and flat hierarchies seem to be complements with works councils and collective bargaining, and autonomous work groups substitutes. Arguably unions and works councils are not favorably disposed to workgroups with their own financial discretion, while plants without either industrial relations institution may encourage autonomous work groups as a means of improving their performance. On the other hand, teamwork and flat hierarchies may go well together with works councils and collective bargaining because employees might be intrinsically better motivated with less need for supervision.

Model (3) is estimated for all workers and for men and women separately, using both OLS and wage quantile regression methods. We also present results for a number of separate sub-samples: manufacturing/services, eastern/western Germany, males/females, Germans/foreigners, and for five different qualification groups. Proceeding in this way allows us to offer a detailed anatomy of the potential works council mark-up for different groups of employees.

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 Statistics Register, which contains information on more than 98 percent of the employees and trainees included in the establishment panel (see Bender et al., 2000; 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, and three dummies for employee skills. (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. We note that Gürtzen (2006, Table 1) provides tenure information on the basis of 1995-2002 LIAB data that do not take into account that tenure is left censored. The information on length of (potential) tenure 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. First of all, the powers of their councils are to all intents and purposes fixed; otherwise, they are increasing in establishment size. Second of all, 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.

We include a broad range of covariates in the earnings equation in order to reduce unobserved heterogeneity to a minimum. Besides information on an individual's gender, age, and tenure, we not only include four professional skill levels but also six schooling levels together with information on whether the individual is a German national or a foreigner and works in western Germany as opposed to eastern Germany. In addition to employment size and works council and collective bargaining status, our establishment-level variables also include information on whether the plant earns high profits in comparison to its competitors, if it exports, pays an overtime supplement, and employs modern technical equipments. Full details are given in Appendix Table 1.

Findings

Summary data on worker (mean) characteristics are given in Table 1A. The main differences between plants with and without works councils are as follows. First, workers in works council establishments have higher wages than their non-works council counterparts: log daily wages of 4.59 and 4.13, respectively. (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.) Second, job tenure is somewhat longer in establishments with works councils than in establishments without works councils: 13.54 and 9.76 years, respectively. Third, white-collar workers are more prevalent in works council establishments; conversely, blue-collar workers in the two lowest skill categories are outnumbered by those in non-works council workplaces by an 11 percentage point margin. Fourth, collective bargaining coverage is almost universal (94 percent) for workers in works council establishments but considerably lower in the case of plants without them (42 percent).[13] In sum, the observed worker characteristics in our sample are reminiscent of those reported in the union-wage

literature: employees in works council establishments evince higher wages, higher skills, higher tenure, and lower wage dispersion.

(Tables 1A and 1B near here)

Corresponding establishment means are presented in Table 1B. Observe that there are fewer works council establishments than non-works council establishments, with the latter outnumbering the former by a twelve percentage point margin. Disparities with respect to the means reported in Table 1A reflect the fact that larger establishments (namely, those with 250 or more workers) have almost complete works council coverage. The difference in log wages in works council establishments is equal to 0.36 and tenure is 3.3 years longer. Collective bargaining coverage is also much higher in works council establishments. Finally, although not shown in the table, the establishment-level data point to lower tenure among women than men. Women are also much less likely than men to earn overtime supplements. These disparities may be expected to contribute to the observed wage gender gap of a little over 20 percent in favor of men observed at the establishment (and individual) 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 1A. This premium falls once establishment variables, including collective agreements coverage, and individual employee characteristics are added to the specification, suggesting that a material share of the wage gap can be explained by systematic sorting of firms and employees. Specifically, after adding worker and plant characteristics, the coefficient on the works council variable in column 2 implies an 11.9 percent wage premium [strictly $(e^{0.119} - 1) \times 100$] and this falls to 9.5 percent (column 3) with the further

addition of the average co-worker characteristics. The regressors have the expected signs. Thus, wages increase with age, tenure, qualifications, and professional status. They are lower for women and foreigners. Further, wages are higher in larger establishments and in establishments reporting high profits and paying overtime supplements.

The final column of Table 2 shows the results for the earnings equation once we control for the self-selection of workers into establishments by their works council and collective agreement status. As can be seen, the major implication of this endogeneity correction is a further decline in the works council coefficient, which now falls to 6.3 percent (row 1). Some comment is necessary on the exact procedure we have followed to obtain the results reported in column (4). It will be recalled that we decided to tackle potential endogeneity bias by first estimating a bivariate probit regression in which worker choices are taken interdependently and then adding to model (3) the two inverse Mills' ratio terms – one for each institution (works council and collective agreements). Since in an instrumental variables approach all covariates of the earnings equation have to be included and we have no priors as to the specific set of instruments that should be included in each choice equation, we assumed quite pragmatically that they are exactly the same. (Indeed, as noted below, only a very few arguments failed to achieve statistical significance in either equation.) We use three organizational arguments – namely, flat hierarchies, team work, and autonomous working groups – as identifying variables in our approach. The full results of this procedure are remitted to Appendix Table 2, where the three instruments appear in the first panel of the table. They are individually and jointly highly statistically significant[14] and have the expected sign while they have no influence in the earnings equation.[15] That is, flat hierarchies and team work increase the probability of an

individual being in an establishment with a works council and covered by a collective agreement, while autonomous working groups seem to work in the opposite direction.[16]

And what of the role of collective agreements? Taking into consideration only the results reported in the last column of Table 2, we recall that the works council wage differential in non-covered establishments (i.e. the works council coefficient in row 1) was 6.3 percent. In covered establishments, the last entry in the second row of the table shows that there is an extra premium of 4.3 percent for workers in establishments with works councils. In turn, in covered establishments without works councils, workers get a mark-up of 5.8 percent relative to their counterparts in establishments without collective agreements (and no works councils). *Vulgo:* there is no evidence of that the process of wage setting in Germany precludes the emergence of a significant premium for employees covered by collective agreements or that any such premium is moderated in works council settings.

The interaction of works councils and collective bargaining is further investigated in Table 3A, where summary results of dividing the entire sample into two groups according to their collective agreement status (covered/not covered) are provided. In this way we are allowing all coefficients in the wage regression, not just that attaching to work council status to vary.

As can be seen from the first column of Table 3A, the coefficient estimate associated with the presence of the two institutions is roughly of the same magnitude as the sum of the first two terms in the final column of Table 2 (column 4). In turn, the coefficient in the second column of Table 3A, which should be approximately equal to the works council coefficient in Table 2 (column 4), under the hypothesis that the pooling is valid, is somewhat higher than predicted. As a result, allowing for

differences in slopes of individual attributes across covered and uncovered establishments, produces the result that works council impact on individual earnings in uncovered establishments is very roughly the same as in covered establishments. But it does nothing to suggest in the manner of the recent literature that collective agreements moderate wage pressure from below.

As a final robustness check on the role of collective bargaining, we also allowed for the case where the collective bargaining variable distinguishes between coverage by firm- and sectoral-level agreements. In this case, and to control for the endogeneity of workers' decisions, we introduced three selectivity terms obtained from running three univariate probits: one for each type of collective agreement and one for the works councils variable. (The percentage of establishments covered by a firm-level collective agreement is approximately 8 percent of the total.) Apart some minor differences in the respective rates of return to worker and establishment characteristics across the two sub-samples, the main finding is that the works council effect does not seem to vary with the type of collective agreement. Indeed, the works council effect (corresponding to Table 3A) was found to be approximately equal to 10 and 11 percent for sectoral and firm-level agreements, respectively. Both coefficients are highly statistically significant.[17]

(Table 3A near here)

Turning to the separate summary results by gender in Table 3B, we obtain the interesting *ceteris paribus* result that the presence of a works council benefits female workers in particular: the mark-up is 9.3 percent in the case of women as compared with 4.5 percent for men (row 1). Taking into account the interaction with collective bargaining, the joint presence of the two institutions implies a substantially higher wage than in circumstances where there is a works council but no collective

agreement coverage: 19.9 percent in the case of women versus 9.3 percent, and 14.5 percent in the case of men versus 4.5 percent, together implying a wage differential of 5.4 percentage points in favor of women. Since women have lower wages on average, this finding implies that the two institutions do attenuate the gender differential in Germany. This attenuation is also reported by Heinze and Wolf (2006), using a measure of the firm-specific gender wage gap, and by Gartner and Stephan (2004), using the decomposition suggested by Juhn et al. (1993).

(Table 3B near here)

Heterogeneity in the impact of works councils on the earnings of different employee groups is also confirmed in Table 3C, which provides summary results by schooling level. It can be seen that the wage premium associated with works council presence is crudely decreasing in the skill (or schooling) level, namely, from around 9.8 percent for the least skilled (secondary education without a professional qualification) to 6.3 percent (workers with a university degree). So there is some modest indication here as well that works councils per se play a role in wage compression, narrowing to some degree the wage gap between high- and low-schooled individuals. This narrowing is again slightly more evident when we take collective bargaining into account: taken in conjunction the two institutions yield a relative premium of 4.5 in favor of the group with the lowest schooling level vis-à-vis the highest.

(Table 3C near here)

Summary results for sub-samples based on location (eastern versus western Germany), sector (manufacturing/services), and nationality (German/nonGerman) are given in Table 3D. It can be seen that, while benefiting nearly all such groups, works councils are seemingly more favorable to foreigner workers and to workers in eastern

Germany, while workers in establishments with works councils earn more if they are employed in the service sector. For their part, collective agreements are more favorable in manufacturing, to foreigners and (marginally so) to workers in establishments located in eastern Germany. The reinforcing wage effects of the two institutions taken together are more important than any resulting differential effects.

(Table 3D near here)

Finally, Table 4 summarizes findings from fitting quantile regressions to our earnings data for all workers and for the gender sub-samples. Results are provided for the 0.2, 0.4, 0.6, and 0.8 quantiles. The all-worker results in the first row of the table point to a works council premium that is broadly increasing in earnings. Only when works councils are taken in conjunction with collective bargaining status do we observe a reversal of this trend: the premium declines from 19.6 (=2.0+6.1+5.6) percent in the case of the lowest quantile to 14.0 (=2.7+4.3+3.2) percent for the highest quantile. For males, the joint premium for the 0.2 quantile is 17.2 percent as compared with only 11.2 percent for the 0.8 quantile. The difference is more pronounced in the case of females, where the corresponding values are 25.4 and 16.5 percent, respectively. These results again show that the institutions of industrial relations on net are associated with wage compression in Germany.

(Table 4 near here)

All the above results pertain to our full sample of establishments. As a robustness check, we now turn to 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 more generally they are increasing in employment; second, the distribution of establishments with and without works

councils is more even. But the sub-sample contains many fewer individuals (some 100,000 workers in 3,000 establishments).

Beginning with the descriptive statistics, for the sub-sample as for the full sample, 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. (In each case, full details are available on request.)

Appendix Table 3 contains *cet. par.* findings corresponding to those earlier reported for the full sample in Tables 3A through 3D. They show the following results. First, there is a clear reduction in the works council premium: compared with the full sample, the (poorly determined) works council coefficient is reduced by some 60 percent. Second, the works council premium is higher in association with a collective wage agreement, especially for female workers. Third, in running separate earnings according to the presence or absence of a collective agreement, works councils have a much stronger effect on earnings where there is coverage: the works council premium is 8.7 percent versus a statistically insignificant 3.2 percent. Fourth, the works council coefficient estimate broadly declines with the skill content (albeit not monotonically), while if anything the effect of collective agreement coverage works in an opposite direction. Fifth, works councils and collective bargaining coverage have bigger mark-ups both jointly and severally in the cases of foreign workers and manufacturing.

(Table 5 near here)

In Table 5, however, we present full results from the quantile regressions for the 21-100 employees sub-sample. As it can be seen, all works councils are again

more favorable to women than men, but there is also no indication of any independent works council role in reducing wage dispersion along quantiles of the distribution. The results are similar to those for the all worker sample even if the works council coefficient estimates are typically smaller. Again, only taken in conjunction with collective bargaining is there evidence of narrowing, which as before is more noticeable for females. On net, then, we can conclude that with some exceptions there is broad consistency in the findings for the two samples. On net, then, we can conclude that with some exceptions there is broad consistency in the findings for the two samples.

Conclusions

This is one of only a few papers to examine in a detailed fashion the effect of works councils on wages. After controlling for worker and establishment heterogeneity, as well as the selection by individuals into works council and collective agreement coverage, we find that workers in works council firms earn more than their counterparts elsewhere. This result is *prima facie* consistent with rent seeking but it still remains possible that the premia stem from the payment of efficiency wages – or, alternatively, that initial rents are converted into compensating wage differentials. In subsequent work we propose to evaluate these two alternatives, exploiting differences in job tenure in the manner of Card and de la Rica (2006).[18]

Importantly, the works council premium applies more or less across the board. Thus it is observed by gender, schooling level, nationality, broad sector, and position within the earnings distribution. Only for smaller establishments with 21 to 100 employees are works council effects often muted (see below).

Works councils are of course embedded in the dual system of industrial relations in Germany, which is why we controlled for worker selection into each institution. For some time, it was assumed that coverage by a collective bargaining agreement was not a significant determinant of wages by virtue of the extension of collective agreements to the majority of employees in an industry. Latterly, this assumption has come under challenge and in common with some new research we report that collective agreement coverage is independently associated with higher wages. Issues of magnitude aside, we go further and report that this result obtains by gender, schooling (up to university level), nationality, region, across the earnings distribution, and indeed even for smaller plants across many of the gradients examined here.

The association between works councils and collective bargaining proper has *not* been widely examined, although it has become widely accepted that collective agreements police the operations of works councils. In the words of Hübler and Jirjahn, 2003: 490): "Centralized collective bargaining reduces distributional conflicts at the establishment level. Our empirical results show that the impact of work councils on wages is less strong in covered establishments compared to uncovered establishments."[19] As we have seen, this result is also echoed by some other observers even if few would go as far as Jirjahn (2003, Table 2) to claim that the interaction effect is actually strongly negative, or that the independent wage effect of works councils is twice as strong outside of collective bargaining. Our results are quite at odds with orthodoxy in this regard, although as we have intimated they have receive some recent support. Some specific results here are as follows. First, the interaction term is positive and statistically significant for all workers, for female employees (if not males), and across quantiles of the wage distribution. (It is also positive and

statistically significant for German nationals, for east Germans, and for manufacturing). Second, taken in the round, considering the effects of works councils, collective agreements, and their interaction, the combined wage effect of the institutions of industrial relations as a whole is more strongly positive. This is especially true for the sub-sample of smaller firms where the independent works council effect is weaker. Third, redistributive effects in favor of lower wage groups where observed are more apparent when the institutions of industrial relations are taken as a whole.

We have not reported other than *en passant* on the effects of collective bargaining at firm level and its relation with works council, but the evidence seems to indicate that once the establishment is covered, it does not matter much the type of collective agreement (firm- or sector-level), with the works council effect being approximately of the same size in the two situations. Frankly, we have less faith in modeling the determinants of worker selection into three types of industrial relations institution and hence in these findings. We have therefore chosen instead to paint with a broader brush. That said, the German dual system of industrial relations is coming under increasing devolutionary pressure and the consequences of this more fragmented structure will demand more attention in future work both at the theoretical and empirical levels.

ENDNOTES

[1]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 (see below).

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

[3]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.

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

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

[6]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.

[7]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.

[8]We do not here examine the works councils-performance nexus, but for recent treatments, see Addison et al. (2006, 2007) and Wagner et al. (2006).

[9]For an update of Hübler and Jirjahn's wage analysis, using IAB establishment data for the Lower Saxony subsample, see Gerlach and Meyer (2007).

[10]For a fuller survey of the bargaining coverage literature, see Fitzenberger et al. (2008).

[11]See also Heinze and Wolf's (2006) analysis of the gender gap *within* firms using wage data from the LIAB, 1997-2001. Not only do the authors find that the gender differential is smaller under collective bargaining but also in the presence of works councils (although interaction effects are not estimated). Interestingly, in neither case is the narrowing tendency is mediated by the proportion of females represented.

[12]For example, assuming $e_i = a_i + \varepsilon_i$ and $a_i = X_{1i}\phi_a + Woco_j\mu_a + a_i'$, it follows from equation (1) that $y_i = X_{1i}(B_1 + \phi_a) + Z_jB + Woco_j(\delta_1 + \mu_a) + (a_i' + \varepsilon_i)$. In this case, we can conclude that both β_1^{ols} and δ_1^{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 $e_i = a_i + v_j + \varepsilon_i$, $a_i = X_{1i}\phi_a + Woco_j\mu_a + a_i'$, $v_j = X_{1i}\phi_v + Woco_j\mu_v + v'_j$, and $y_i = X_{1i}(B_1 + \phi_a + \phi_v) + Z_jB + Woco_j(\delta_1 + \mu_a + \mu_v) + (a'_i + v'_j + \varepsilon_i)$.

[13]We do not present in either this table or the next further disaggregations by gender. Suffice it to say that males earn more than females (log wages of 4.61 and 4.37, respectively) and have lower tenure. Familiarly, females are also much more likely to be employed in white-collar jobs. That said, there were no discernible gender differences in works council status or collective agreement coverage while differences in schooling level were inconsequential.

[14]The corresponding chi-square statistic with 6 degrees of freedom for the null of no joint significance is equal to 2,311.1 and the related significance level is better than 1 percent.

[15]The corresponding F-statistic is equal to 1.05, in which case the null of no joint significance cannot be rejected at conventional levels.

[16] We note that the null of no correlation between the error terms in equations 3' and 3'' is also rejected by the data: the *Rho* statistic at the foot of Appendix Table 2 is equal to 0.38 (with a standard error of 0.0037.) Under the alternative hypothesis that there is no correlation between equations (3) and (3'), the results reported below for the full sample and for the separate sample of plants with 21-100 employees are very much the same.

[17]Pooling the two sub-samples and running a model similar to that in Table 2, (column 4), there is however some indication that workers in non-works councils establishments who are covered by collective agreements at firm-level tend to earn less than either (a) workers in establishments covered by sectoral collective agreements and no works councils or (b) workers in works council establishments irrespective of the type of coverage.

[18]In a preliminary investigation of this issue, we estimated a tenure equation across all workers that included (in addition to detailed controls) predicted wages from an equation describing wages in establishments without works councils which was then interacted with works council dummy (present =1, 0 otherwise). The interaction term though positive was of small magnitude, suggesting that only a small part of the higher wages in works council plants reflect rent seeking. Details are available from the authors upon request.

[19]We recognize that their argument applies more strongly to productivity than to wages. But that is another topic of inquiry in and off itself and is not further pursued here.

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Table 1A. Descriptive Statistics, Individual Level.

Variable	*Sample*		
	All workers	*Workers in establishments with works councils*	*Workers in establishments without works councils*
(log) Wages	4.54 (0.41)	4.59 (0.37)	4.13 (0.48)
Tenure (in years)	11.33 (9.46)	13.54 (10.23)	9.76 (8.56)
Fraction female	0.28	0.27	0.34
Age (years)	40.9 (10.02)	41.0 (9.94)	40.0 (10.56)
Fraction in western Germany	0.79	0.82	0.54
Fraction foreign	0.08	0.09	0.05
Distribution by skill level:			
Unskilled blue collar	0.25	0.26	0.24
Low skilled blue collar	0.25	0.23	0.34
Highly skilled blue collar	0.02	0.02	0.02
White collar	0.48	0.49	0.40
Distribution by establishment size:			
5-20	0.01	0.00	0.12
21-100	0.08	0.04	0.41
101-249	0.11	0.09	0.24
250-499	0.13	0.13	0.13
500-999	0.18	0.19	0.07
≥1000	0.49	0.55	0.02
Distribution by schooling level:			
Seceduc1	0.13	0.14	0.11
Seceduc2	0.64	0.64	0.66
Terteduc1	0.01	0.01	0.01
Terteduc2	0.05	0.05	0.03
Polytechnic	0.05	0.05	0.03
University	0.08	0.08	0.04
Fraction covered by collective agreement	0.88	0.94	0.42
Establishment founded before 1990	0.69	0.74	0.40
High profits	0.31	0.31	0.33
Modern technical equipment	0.75	0.75	0.72
Overtime supplement	22.58	22.69	21.25
Export	0.43	0.44	0.29
Fraction covered by works councils	0.90		
Number of observations	1,344,656	1,171,597	130,811

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

Source: LIAB Wave 2001.

Table 1B. Descriptive Statistics, Establishment Level

Variable	*Sample*		
	All establishments	*Establishments with works councils*	*Establishments without works councils*
(log) Wages	4.23 (0.47)	4.43 (0.40)	4.07 (0.46)
Tenure (in years)	8.72 (8.21)	10.34 (9.45)	7.08 (6.62)
Female	0.36	0.34	0.38
Age (years)	40.5 (10.5)	41.7 (10.1)	39.61 (10.6)
Fraction in western Germany	0.62	0.69	0.56
Fraction foreign	0.05	0.06	0.04
Distribution by skill level:			
Unskilled blue collar	0.18	0.19	0.17
Low skilled blue collar	0.32	0.25	0.37
Highly skilled blue collar	0.02	0.02	0.02
White collar	0.48	0.54	0.42
Distribution by establishment size:			
5-20	0.32	0.06	0.52
21-100	0.35	0.30	0.38
101-249	0.14	0.24	0.07
250-499	0.09	0.17	0.02
500-999	0.06	0.13	0.01
≥1000	0.04	0.10	0.00
Distribution by schooling level:			
Seceduc1	0.10	0.11	0.08
Seceduc2	0.67	0.67	0.67
Terteduc1	0.01	0.01	0.00
Terteduc2	0.04	0.05	0.03
Polytechnic	0.03	0.05	0.02
University	0.05	0.08	0.04
Fraction covered by collective agreement	0.61	0.84	0.42
Establishment founded before 1990	0.49	0.60	0.41
High profits	0.26	0.24	0.28
Modern technical equipment	0.69	0.71	0.67
Overtime supplement	17.10	17.9	16.38
Export	0.23	0.32	0.16
Fraction covered by works councils	0.44		
Number of observations	8,579	3,589	4,612

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

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

	(1)	*(2)*	*(3)*	*(4)*
Works council	0.460 (0.019)	0.119 (0.025)	0.095 (0.023)	0.063 (0.023)
Works council * collective agreement		0.035 (0.025)	0.036 (0.024)	0.043 (0.024)
Collective agreement		0.065 (0.016)	0.064 (0.015)	0.058 (0.014)
Worker characteristics:				
Gender (female)		-0.204 (0.005)	-0.183 (0.003)	-0.180 (0.003)
Tenure (in years)		0.012 O(0.001)	0.012 (0.001)	0.010 (0.001)
$Tenure^2$		-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Age		0.032 (0.001)	0.032 (0.001)	0.031 (0.001)
Age^2		-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Secondary school education with professional degree		0.057 (0.006)	0.058 (0.005)	0.050 (0.005)
Tertiary school education without professional degree		(0.047) (0.020)	0.032 (0.020)	0.036 (0.020)
Tertiary school education with professional degree		0.133 (0.008)	0.129 (0.007)	0.118 (0.008)
Polytechnic degree		0.277 (0.009)	0.273 (0.008)	0.260 (0.009)
University degree		0.423 (0.011)	0.417 (0.011)	0.400 (0.012)
Unskilled blue collar		-0.064 (0.007)	-0.072 (0.005)	-0.077 (0.005)
Highly skilled blue collar		0.274 (0.010)	0.257 (0.008)	0.254 (0.008)
White collar		0.276 (0.006)	0.233 (0.005)	0.230 (0.005)
Foreigner		-0.007 (0.005)	-0.010 (0.004)	-0.012 (0.004)
Establishment characteristics:				
Western Germany		0.269 (0.014)	0.232 (0.013)	0.224 (0.013)
Establishment founded before 1990		-0.035 (0.012)	-0.032 (0.011)	-0.040 (0.011)
High profits		0.016 (0.008)	0.018 (0.008)	0.028 (0.008)
Payment above collective agreement		0.024 (0.009)	0.023 (0.008)	0.021 (0.008)
Modern technical equipment		0.007 (0.009)	0.002 (0.008)	-0.001 (0.008)
Overtime supplement		0.001 (0.000)	0.001 (0.000)	0.001 (0.000)
Export		-0.006 (0.012)	-0.007 (0.011)	-0.010 (0.011)
Establishment size 21-100		0.034	0.025	0.025

		(0.013)	(0.013)	(0.014)
Establishment size 101-249		0.046 (0.015)	0.038 (0.014)	-0.067 (0.019)
Establishment size 250-499		0.071 (0.016)	0.064 (0.016)	-0.074 (0.022)
Establishment size 500-999		0.112 (0.016)	0.105 (0.016)	-0.050 (0.024)
Establishment size more than 1000		0.162 (0.017)	0.148 (0.016)	-0.014 (0.023)
Establishment-average worker characteristics:				
Average female			-0.231 (0.026)	-0.237 (0.025)
Average age			0.001 (0.001)	0.001 (0.001)
Average foreigners			0.058 (0.045)	0.060 (0.047)
Average unskilled blue collar			-0.796 (0.067)	-0.780 (0.058)
Average low skilled blue collar			-0.890 (0.068)	-0.882 (0.058)
Average high skilled blue collar			-0.692 (0.114)	-0.743 (0.109)
Average white collar			-0.609 (0.067)	-0.609 (0.058)
Inverse Mills' ratio for works council presence				-0.197 (0.025)
Inverse Mills' ratio for collective agreement coverage				-0.021 (0.066)
R^2	0.11	0.61	0.62	0.63
F		982	1,346	1,297
N	1,269,599	1,269,599	1,269,599	1,263,752
Number of establishments	8,178	8,178	8,178	8,118

Notes: Dependent variable: log wages. 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. Column (4) contains the inverse Mills' ratio terms obtained from the bivariate probit model presented in Appendix Table 2. Each specification includes industry dummies in addition to the arguments shown in the table. Standard errors are in parentheses and are adjusted for clustering at the establishment level and are heterogeneity robust.

Table 3A. The Determinants of (Log) Wages by Collective Agreement Status, Summary Findings

	Collective agreement	*No collective agreement*
Works council	0.104 (0.010)	0.092 (0.018)
R^2	0.61	0.66
F	1,185	296
N	1,206,989	56,763
Number of establishments	6,697	1,421

Notes: Dependent variable: log wages. The full specification of the model includes all other covariates shown in column (4) of Table 2.

Table 3B. The Determinants of Log Wages by Gender, Summary Findings

	Males	*Females*
Works council	0.045 (0.024)	0.093 (0.027)
Works council* collective agreement	0.035 (0.025)	0.064 (0.029)
Collective agreement	0.065 (0.014)	0.042 (0.019)
R^2	0.64	0.53
F	1,025	386
N	909,476	354,276
Number of establishments	7,568	7,390

Note: See Notes to Table 3A.

Table 3C. The Determinants of (Log) Wages by Schooling Level, Summary Findings

	Seceduc1	*Seceduc2*	*Terteduc2*	*Polytechnic*	*University*
Works council	0.098 (0.037)	0.063 (0.023)	0.002 (0.039)	0.079 (0.032)	0.063 (0.042)
Works council* collective agreement	-0.003 (0.038)	0.046 (0.024)	0.056 (0.040)	0.031 (0.034)	0.020 (0.046)
Collective agreement	0.087 (0.028)	0.068 (0.014)	0.033 (0.026)	0.058 (0.024)	0.054 (0.039)
R^2	0.54	0.59	0.51	0.55	0.45
F	175	874	422	324	320
N	170,009	807,554	64,348	57,715	97,897
Number of establishments	4,214	7,706	3,722	3,499	3,553

Note: See Notes to Table 3A.

Table 3D. The Determinants of (Log) Wages by Nationality, Location and Sector, Summary Findings

	Nationality		*Location*		*Sector*	
	German	*Foreigner*	*Western Germany*	*Eastern Germany*	*Manufac -turing*	*Services*
Works council	0.059 (0.022)	0.090 (0.044)	0.040 (0.033)	0.074 (0.027)	0.045 (0.022)	0.068 (0.033)
Works council*collective agreement	0.051 (0.023)	-0.030 (0.045)	0.022 (0.035)	0.106 (0.029)	0.044 (0.023)	0.054 (0.035)
Collective agreement	0.055 (0.014)	0.092 (0.026)	0.045 (0.019)	0.049 (0.019)	0.061 (0.014)	0.028 (0.024)
R^2	0.63	0.57	0.57	0.60	0.66	0.59
F	1,252	216	955	486	1,548	652
N	1,161,446	102,306	1,000,742	263,010	783,107	480,645
Number of establishments	8,100	3,407	5,323	3,336	3,920	4,198

Note: See Notes to Table 2.

Table 4: Quantile (Log) Wage Regressions, Summary Findings.

	Quantiles			
	0.20	*0.40*	*0.60*	*0.80*
All workers				
Works council	0.052 (0.002)	0.074 (0.002)	0.083 (0.002)	0.070 (0.002)
Works council * collective agreement	0.063 (0.003)	0.029 (0.002)	0.008 (0.002)	0.008 (0.003)
Collective agreement	0.081 (0.002)	0.086 (0.002)	0.080 (0.002)	0.062 (0.002)
Pseudo-R^2	0.43	0.42	0.43	0.44
Male workers				
Works council	0.036 (0.003)	0.055 (0.003)	0.068 (0.003)	0.058 (0.003)
Works council * collective agreement	0.049 (0.003)	0.027 (0.003)	0.006 (0.003)	0.010 (0.003)
Collective agreement	0.087 (0.002)	0.088 (0.002)	0.067 (0.002)	0.044 (0.002)
Pseudo- R^2	0.44	0.43	0.43	0.44
Female workers				
Works council	0.101 (0.005)	0.113 (0.004)	0.114 (0.004)	0.095 (0.004)
Works council * collective agreement	0.095 (0.005)	0.044 (0.004)	0.015 (0.004)	0.017 (0.004)
Collective agreement	0.058 (0.004)	0.073 (0.003)	0.072 (0.003)	0.053 (0.003)
Pseudo- R^2	0.36	0.37	0.37	0.37

Notes: Dependent variable: log wages. The full specification of the model includes all other covariates shown in column (4) of Table 2. Standard errors are in parentheses.

Table 5. Quantile (Log) Wage Regressions, Establishment with 21-100 Employees, Summary Findings.

	Quantiles			
	0.20	*0.40*	*0.60*	*0.80*
All workers				
Works council	0.020 (0.006)	0.019 (0.006)	0.030 (0.006)	0.027 (0.007)
Works council * collective agreement	0.061 (0.007)	0.063 (0.006)	0.051 (0.006)	0.043 (0.007)
Collective agreement	0.056 (0.004)	0.051 (0.003)	0.045 (0.003)	0.032 (0.004)
Pseudo-R^2	0.38	0.40	0.39	0.39
Male workers				
Works council	0.016 (0.007)	0.015 (0.006)	0.027 (0.007)	0.023 (0.008)
Works council * collective agreement	0.052 (0.008)	0.050 (0.006)	0.036 (0.007)	0.034 (0.008)
Collective agreement	0.042 (0.004)	0.044 (0.003)	0.045 (0.004)	0.040 (0.004)
Pseudo-R^2	0.39	0.41	0.42	0.42
Female workers				
Works council	0.064 (0.015)	0.049 (0.011)	0.064 (0.010)	0.029 (0.011)
Works council * collective agreement	0.076 (0.016)	0.084 (0.012)	0.058 (0.011)	0.076 (0.012)
Collective agreement	0.082 (0.008)	0.062 (0.006)	0.049 (0.006)	0.008 (0.006)
Pseudo-R^2	0.32	0.36	0.36	0.34

Notes: Dependent variable: log wages. The full specification of the model includes all other covariates shown in column (4) of Table 2. Standard errors are in parentheses.

Appendix Table 1. Description of Variables.

Variable	*Definition*
(a)	
Wages	Daily (log) gross wage (in €). 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 (female)	Dummy: 1 if worker is female, 0 otherwise.
Tenure	Number of days since beginning work at the current establishment (implemented for censored values).
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.
Establishment founded before 1990	Dummy: 1 if establishments was founded before 1990, 0 otherwise
Export market	Dummy: 1 if the percentage share of exports in the establishment’s annual turnover is greater than zero, 0 otherwise.
Flat hierarchies (instrument)	Dummy: 1 if establishment reduced the number of hierarchies , 0 otherwise
Team work (instrument)	Dummy: 1 if establishment introduced team work, 0 otherwise
Autonomous working groups (instrument)	Dummy: 1 if establishment introduced working groups with financial autonomy , 0 otherwise
Size21_100	Dummy: 1 if the number of employees is between 21 and 100, 0 otherwise.
Size101_249	Dummy: 1 if the number of employees is between 101 and 249, 0 otherwise.
Size250_499	Dummy: 1 if the number of employees is between 250 and 499, 0 otherwise.
Size500_999	Dummy: 1 if the number of employees is between 500 and 1,000, 0

	otherwise.
More than 1000	Dummy: 1 if the number of employees is greater than 1,000, 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. Bivariate Probit Choice Model

	Works council	*Collective Agreement*
Instruments:	(1)	(2)
Flat hierarchies	0.020 (0.005)	0.187 (0.007)
Team work	0.212 (0.007)	0.134 (0.008)
Autonomous working groups	-0.051 (0.006)	-0.139 (0.008)
Worker characteristics:		
Gender (female)	0.022 (0.006)	0.003 (0.007)
Tenure (in years)	0.045 (0.001)	0.035 (0.001)
Tenure^2	-0.001 (0.000)	-0.001 (0.000)
Age	0.007 (0.001)	-0.007 (0.002)
Age^2	-0.000 (0.000)	0.000 (0.000)
Seceduc2	0.142 (0.006)	0.084 (0.008)
Terteduc1	0.108 (0027)	0.062 (0.034)
Terteduc2	0.271 (0.013)	0.098 (0.015)
Polytechnic	0.289 (0.013)	0.044 (0.016)
University	0.461 (0.011)	0.164 (0.013)
Unskilled blue collar	0.079 (0.008)	0.054 (0.011)
Highly skilled blue collar	-0.037 (0.017)	-0.014 (0.022)
White collar	-0.054 (0.007)	0.006 (0.009)
Foreigner	0.029 (0.010)	0.024 (0.014)
Establishment characteristics:		
western Germany	0.046 (0.008)	-0.004 (0.010)
Establishment founded before 1990	0.141 (0.007)	0.073 (0.10)
High profits	-0.192 (0.005)	-0.043 (0.006)
Payment above collective agreement	0.291 (0.006)	8.839 (17842)
Modern technical equipment	-0.013 (0.005)	-0.019 (0.006)
Overtime supplement	-0.002 (0.000)	0.000 (0.000)

Export	-0.089 (0.006)	-0.231 (0.008)
Establishment-average worker characteristics:		
Average female	-0.741 (0.013)	-0.160 (0.017)
Average age	0.097 (0.000)	0.062 (0.001)
Average foreigners	0.890 (0.028)	0.576 (0.039)
Average unskilled blue collar	-2.186 (0.507)	-0.117 (0.326)
Average low skilled blue collar	-2.266 (0508)	-0.174 (0.325)
Average highly skilled blue collar	0.537 (0.512)	0.640 (0.336)
Average white collar	-1.244 (0.507)	-0.072 (0.325)
Establishment size 21-100	0.984 (0.013)	0.203 (0.013)
Establishment size 101_249	1.819 (0.013)	0.495 (0.014)
Establishment size 250_499	2.344 (0.013)	0.788 (0.014)
Establishment size 500_999	2.755 (0.014)	0.945 (0.014)
Establishment size more than 1000	3.540 (0.015)	1.60 (0.015)
Rho	0.38 (0.0037)	
Wald chi^2 (102) (Prob > chi^2)	263575 (0.00)	
N	1,276,518	

Notes: The bivariate probit model is described in equations (3') and (3'') in the text. The model includes 16 sector dummies. Standard errors in parentheses.

Appendix Table 3. The Determinants of (Log) Wages for Different Samples, Establishments with 21-100 Employees, Summary Findings.

Sample	Coefficient (standard error)		
	Works council	Works council*Collective agreement	Collective agreement
All workers (without inverse Mills' ratio terms)	0.027 (0.026)	0.061 (0.027)	0.037 (0.014)
All workers (with inverse Mills' ratio terms)	0.025 (0.026)	0.061 (0.027)	0.036 (0.014)
Collective agreement	0.087 (0.009)		
No collective agreement	0.032 (0.025)		
Males	0.020 (0.024)	0.047 (0.026)	0.033 (0.014)
Females	0.046 (0.036)	0.082 (0.038)	0.036 (0.019)
Seceduc1	0.098 (0.037)	-0.020 (0.046)	0.050 (0.030)
Seceduc2	0.035(0.027)	0.057 (0.029)	0.040 (0.013)
Terteduc2	-0.016 (0.046)	0.086 (0.049)	0.010 (0.029)
Polytechnic	0.016 (0.037)	0.063 (0.040)	0.061 (0.026)
University	0.005 (0.040)	0.062 (0.044)	0.070 (0.033)
German	0.023 (0.026)	0.065 (0.027)	0.034 (0.014)
Foreigner	0.096 (0.048)	-0.054 (0.050)	0.101 (0.029)
Western Germany	0.001 (0.038)	0.055 (0.040)	0.002 (0.020)
Eastern Germany	0.054 (0.296)	0.069 (0.033)	0.047 (0.017)
Manufacturing	0.060 (0.028)	0.013 (0.030)	0.045 (0.014)
Services	-0.003 (0.039)	0.101 (0.042)	0.016 (0.023)

Note: see Table 2.