Non-technical summary

Germany has a more compressed wage structure than most industrialized countries and many commentators see wage compression as an important source of high unemployment. One possibility is that this compression is partly the result of the country's unique system of workplace codetermination. But although German's works councils have far reaching powers, their impact on the anatomy of wages has not been examined heretofore. The reasons for this neglect include historically inadequate data – we need linked employer employee data to calculate not only the average wage level per establishment but also the variance in wages – and perhaps even the supposition that the role of works councils must be marginal since the enabling legislation (the Works Constitution Act) seemingly suppresses any independent wage bargaining role unless the entity is given express permission under the relevant sectoral wage agreement.

The present paper therefore looks at the impact of the works council on the structure of wages in Germany using the 2001 wave of the nationally representative linked employer employee data set of the Institute for Labour Market Research in Nuremberg (LIAB). It deploys augmented Mincerian wage equations and also takes into account the possible endogeneity of works councils as well as unobserved establishment and employee heterogeneity – in the former case by adding a propensity score for the likelihood of observing a works council, and in the latter case by including average employee characteristics.

It is shown that works councils elevate wages. Moreover, the works council premium exceeds any collective bargaining markup, at either sectoral or establishment level. Quantile regressions further reveal that the wage effect tends to be greatest lower down in the earnings distribution. In other words, works councils reduce the standard deviation of wages and the coefficient of variation of wages in a manner comparable to collective bargaining proper. In contrast to the literature on collective bargaining, however, women are shown to benefit more

from the presence of works councils than do men. Accordingly, works councils attenuate the gender wage gap.

Finally, the paper also investigates whether the longer tenure of employees in works councils establishments reflects higher wages, signalling rent extraction, or compensating differentials. Once predicted wages from an equation describing wages of employees in establishments without works councils are interacted with the works council dummy, it is found that only a small part of the higher wages seem to indicate rent seeking. This finding receives support from a separate analysis that compares the direct effect of wages and works councils on tenure.

Works Councils and the Anatomy of Wages*

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ABSTRACT
This paper provides the first full examination of the effect of German works councils on wages using matched employer-employee data (specifically, the LIAB for 2001). We find that works councils are associated with higher earnings. The wage premium is around 11 percent (and is higher under collective bargaining). This result persists after taking account of worker and establishment heterogeneity and the endogeneity of works council presence. Next, using quantile regressions, we find that the works council premium is decreasing with the position of the worker in the wage distribution. And it is also higher for women than for men. Finally, the works council wage premium is associated with longer job tenure. This suggests that some of the premium is a noncompetitive rent, even if works council voice may dominate its distributive effects insofar as tenure is concerned.

JEL Classification: J31, J50.
Keywords: matched employer-employee data, rent seeking, tenure, wages, wage distribution, works councils.

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I. Introduction

The effects of works councils on most aspects of firm performance – profitability, labor productivity, employment growth, and more recently investment in tangible capital – have been investigated for a number of years now (for a survey, see Addison et al., 2004b). Altogether less well investigated have been their effects on wages. This is at first blush curious because analysts reporting adverse effects on other outcomes have tended to rely on rent-seeking behavior, and not just bureaucratization, by way of explanation for their findings. On closer inspection, however, the source of the comparative neglect of wage determination is clear: 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 also have been deflected by the very terms of the German legislation – the Works Constitution Act – that 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 hypothesized that works councils seek equal pay and reduced earnings dispersion. This propensity may be an insurance strategy and reflect the preferences of risk-averse employees (Horn and Svensson, 1986). Further, an earnings function approach in conjunction with information on tenure also permits the analyst to address 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 (LIAB), which

combines the employment register statistics 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 LIAB is described in section IV and is prefaced in section III by a statement of our empirical model, which draws on Card and de la Rica (2006) insightful treatment. 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 a consideration of the institutional setting, including 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. Decisions on strikes and lockouts are similarly detached from the local 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 may only negotiate plant agreements with local management on matters that are not covered, or not usually covered, by collective agreements, unless a collective agreement expressly authorizes otherwise (section 77(3) of the Works Constitution Act). That said, they have always been involved in wage setting for two main reasons. First, their extensive codetermination rights (noted below) convey power that can be exercised *sotto voce*. 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 actively participated in the fixing of

wages above *Tarif* levels (i.e. the formal wage schedules set under collective bargaining) and the provision of special bonuses and allowances. Nevertheless, 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, 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, and 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). At the same time, 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 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.[1] 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 LMS/RLS 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*).[2] 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.[3]

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.[4] Interestingly, Hübler and Jirjahn report no evidence of an 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 Addison et al., 2006, for a discussion of the erosion of collective bargaining coverage).[5] 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.

Yet more recent studies have examined the link between collective bargaining proper and wages, but without controlling 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, contrary to the previous study, 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, collective bargaining proper may be expected to influence wages in Germany no less than in other nations.

III. Methodology

Earnings regressions

Our starting point is the standard Mincerian earnings function in which individual (log) wages, y_i, are 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 establishments, Z_j. In particular, we

are interested in the specific role of the works council institution, F_j. We thus specify the model

$$y_i = X_{1i}B_1 + Z_jB + F_j\delta + e_i . \quad (1)$$

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 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.[6] 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} to equation (1) may enable us to control for a key source of contamination. Accordingly, we have

$$y_i = X_{1i}B_1 + X_{2j}B_2 + Z_jB + F_j\delta + u_i ,$$

(2) where, X_{1i}, X_{2j}, and Z_j denote the characteristics of workers, co-workers in the same establishment, and establishments, respectively, and F_j again denotes the works council status of the establishment.

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 (or the normal hazard function) of a given establishment having a works council, $\hat{p}_j$, giving

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

This model will be estimated for all workers and for men and women 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.

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

portion of the pie (surplus) *or* the ability of firms to extract a higher worker effort from workers by paying efficiency wages. In the former case, workers are paid above 'normal' wages, and we should observe, everything else constant, higher tenure, T_i. In the latter case, establishments pay a compensating differential and no correlation between tenure and works council status should be expected. To test these conflicting hypotheses, we specify the following model

$$T_i = X_{1i}B_1 + X_{2j}B_2 + Z_jB + F_j\delta + e_i . \quad (4)$$

Once again the parameter estimates – in particular, the coefficient δ – may be biased. In order to capture the true impact of works councils on tenure, therefore, we will adopt the strategy followed by Card and de la Rica (2006). Specifically, in a first step, we look at the wage profile of workers by estimating model (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

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

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

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 within a firm and in annual end-year reports. The employment statistics contain data on the individual's three-digit occupation, daily gross wage in € 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 imputed 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. 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. Finally, we also test whether the wage effect of works councils depends on the collective bargaining regime and if it differs between selected groups of employees. Accordingly, we add interaction terms between these variables and the works council dummy.

V. Findings

Summary data on worker (mean) characteristics for the entire sample and by gender and works council status are given in Table 1a. Clearly, workers in works council establishments have higher wages than their non-works council counterparts (with log daily wages of 4.59 and 4.13, respectively) and men also earn more than women (log wages of 4.61 and 4.37, respectively). There is also evidence that white-collar workers are more prevalent in works council establishments, while low skilled blue-collar workers are in greater preponderance in non-works council workplaces by 11 percentage point margin.[7] Overall, the proportion of workers in the two lowest skill categories, if not educational categories, is also higher in establishments where no works council is present. Not surprisingly perhaps, collective bargaining coverage is almost universal (94 percent) for workers in works council establishments but much lower in the case of plants without councils (42 percent). Differences in collective agreement coverage by gender are minimal, and the same is true of the gender differences in schooling. Some 90 percent of all workers are in establishments with works councils.

(Tables 1a and 1b near here)

Corresponding establishment means are presented in Table 1b. As it is apparent, there are fewer works council establishments than non-works council establishments – the latter outnumber the former by a twelve percentage point margin. The disparity with respect to Table 1a is due to the fact that bigger establishments (namely those with 250 or more workers) have almost complete works council coverage. Wages are 37 percent higher in works council establishments, and tenure is 2.7 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.

(Tables 2a and 2b near here)

Table 2a 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 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 13.2 percent (column 2) and this falls to 11.1 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 Gürtzgen, 2005; 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 earning high profits and paying overtime supplements.

There is little indication that self-selection by establishments 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 11.1 to 11.4 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 that reported by Stephan and Gerlach (2005, p. 2301) in their study of Lower Saxony, 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.

Turning to the separate results by gender in Table 2b, 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 2, 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 9.8 percent.

(Table 3 near here)

The presence of a gender gap is also confirmed in Table 3 for all schooling levels. From the second row of the table it can be seen that females earn between 12.3 and 18.5 percent less than do males. For its part, the wage premium associated with works council presence is broadly though not monotonically decreasing in the skill (or schooling) level, namely, from around 11 percent for the least skilled (secondary education without a professional qualification) to 8.7 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. We note, however, that this picture is less evident when we interact the works council dummy with the education dummies (see Appendix Table 2).

(Table 4 near here)

Table 4 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.[8] For females, the premium for the 0.2 quantile is almost 20 percent as compared with only 12 percent at the 0.8 quantile. The differences for men are more muted at 11.0 and 6.7 percent, respectively. These results show again that works councils have a 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 2. 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 roughly 10 percent (=0.106-0.008), whereas for firm level bargaining the corresponding premium is some 22 percent (0.106 +0.113). 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. Appendix Table 3 presents the results of this exercise. 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 just around -0.8 and -0.02, respectively.

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 (4) and (5). The results are reported in Table 5. If works councils imply higher wages, *ceteris paribus* workers in establishments with works councils will 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.

(Table 5 near here)

The tenure regression in the first column of Table 5 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). We first identify the wage profile in other than works council establishments and then interact 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 5. 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 5, the results carry over to male and female workers. Note that, for female workers, the coefficient estimate for the interaction term between predicted wages and works councils is clearly smaller than for males and fails to achieve statistical significance.

At this stage it is also worthwhile to attempt to disentangle the relative importance of wages versus works council regime on the tenure profiles of individuals through a different route. The question is again one of whether the

observed higher tenure in works council plants results from the greater attractiveness/efficiency of workplaces with works councils or instead reflects the outcome of rent-seeking process (vulgo: the 'voice' versus 'monopoly' arguments adapted to the works council institution). We carry out this test by implementing the Freeman-Medoff tenure model for unions in which the two effects –voice and monopoly – are assumed to be captured simply by looking at the corresponding elasticity.[9]

(Table 6 near here)

The results are given in Table 6. As in our equations (4) and (5) 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). In fact, the voice/efficiency argument seems to dominate 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 the same order of magnitude as those reported by Freeman and Medoff for the U.S. (1984, Table 6-2).

As a final robustness check on our results, we offer further evidence for a more homogeneous sub-sample of establishments. In order to capture an establishment size bracket with comparable formal powers of works councils and a relatively even distribution of establishments with and without works councils, we restrict ourselves to establishments with between 21 and 100 employees. This sub-sample of smaller establishments contains many fewer individuals (some 100,000 workers in 3,000 establishments). Descriptive statistics are contained in Appendix Table 4a, from which it can be seen again that for works council establishments, average (log) wages are higher and that job tenure is higher. Employees´ qualifications and age in these establishments are also slightly higher.

Establishments with works councils finally are less prone to report high profits, modern technical equipment, or overtime supplements.

As can be seen from Appendix Tables 4b through 4e, there is a clear reduction in the works council premium in the sub-sample of establishments employing 21 to 100 employees.[10] 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 visible. Indeed, differences in coefficients estimates in the quantile regressions are minimal, and even increase for men (see Appendix Table 4e). As a consequence the impact of works councils on the standard deviation of wages is positive, while it is negative but smaller than for the entire sample in the case of the other (coefficient of variation) measure.

Finally, there is evidence that works councils significantly increase job tenure also in the restricted sample (by an extra 0.8 years), but no evidence that increased tenure comes about through via higher wages as the interaction term (predicted wages*works council) is never statistically significant (in Appendix Table 4f). 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 4g and compare with Table 6).

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 establishment 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 able to control for unobserved worker and establishment heterogeneity while also accounting for the selection of plants into works council status.

Another 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. As a consequence, 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). Subject to the caveat provided by our results for the restricted firm sample, the institution of works councils therefore is an interesting additional explanation that has previously 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 à la Card and de la Rica (2006), 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.

Endnotes

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

[2] 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).

[3] 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.

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

[5] As a matter of fact, 49 percent of establishments in western Germany are covered by sectoral collective agreements and these agreements apply to some 65 percent of employees.

[6] For example, assuming $e_i = a_i + \varepsilon_i$ and $a_i = X_{1i}\phi_a + F_j\mu_a + a_i'$, it follows 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).

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

[8] 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 difference in coefficients [with t-values in brackets] for men (women) are: -0.02 [15.05](-0.07

[27.93]) for the difference between 1st and 5th quantile and -0.04 [18.47] (-0.05 [19.12]) for the difference between the 5th and 9th quantile.

[9] Ignoring other covariates, the log-tenure model can be formulated as follows: $\ln T_i = a + b \ln Wage_i + cWoco_i + \omega_i$. A theoretical derivation of this model can be found in Freeman (1980, p. 649).

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

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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	Males	Females
(log) Wages	4.54	4.59	4.13	4.61	4.37
Tenure (in years)	9.81	10.01	5.20	9.98	7.82
Fraction female	0.28	0.27	0.34		
Age (years)	40.9	41.0	40.0	41.4	40.0
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.
Source: LIAB Wave 2001.

Table 1b: Descriptive Statistics (Establishment Level)

Variable	Sample				
	All establishments	Establishments with works councils	Establishments with no works councils	Males	Females
(log) Wages	4.229	4.440	4.067	4.32	4.06
Tenure (in years)	6.86	8.4	5.7	7.1	6.4
Female	0.37	0.35	0.38		
Age (years)	40.6	41.6	39.8	41.0	39.9
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.
Source: LIAB Wave 2001.

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

	(1)	(2)	(3)	(4)
Works council	0.460	0.132	0.111	0.114
	(0.019)	(0.011)	(0.010)	(0.010)
Worker characteristics:				
Gender (female)		-0.204	-0.183	-0.182
		(0.005)	(0.003)	(0.003)
Tenure (in years)		0.014	0.014	0.014
		(0.001)	(0.001)	(0.000)
$Tenure^2$		-0.000	-0.000	-0.000
		(0.000)	(0.000)	(0.000)
Age		0.031	0.031	0.031
		(0.001)	(0.001)	(0.001)
Age^2		-0.000	-0.000	-0.000
		(0.000)	(0.000)	(0.000)
Seceduc2		0.058	0.058	0.057
		(0.006)	(0.005)	(0.005)
Terteduc1		0.048	0.033	0.032
		(0.020)	(0.019)	(0.020)
Terteduc2		0.131	0.127	0.124
		(0.008)	(0.007)	(0.007)
Polytechnic		0.276	0.272	0.270
		(0.008)	(0.008)	(0.007)
University		0.420	0.413	0.411
		(0.011)	(0.011)	(0.011)
Unskilled blue collar		-0.067	-0.073	-0.075
		(0.007)	(0.005)	(0.005)
Highly skilled blue collar		0.276	0.258	0.259
		(0.009)	(0.008)	(0.008)
White collar		0.276	0.234	0.236
		(0.006)	(0.005)	(0.005)
Foreigner		-0.006	-0.010	-0.013
		0.004	0.004	0.0041
Establishment characteristics:				
western Germany		0.231	0.195	0.192
		(0.008)	0.008	0.008
size20_99		0.036	0.028	0.027
		(0.153)	(0.014)	(0.014)
size100_249		0.049	0.041	0.038
		(0.017)	(0.016)	(0.016)

Table 2a (continued)

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 at establishment level		 0.054 (0.010) 0.062 (0.014)	 0.055 (0.009) 0.061 (0.013)	 0.052 (0.009) 0.056 (0.013)
Payment above collective 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		-.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 blue 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 2b: 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)

Table 2b (cont.)

Collective agreement		
sector level	0.049	0.055
	(0.010)	(0.011)
establishment level	0.061	0.046
	(0.013)	(0.017)
Payment above collective agreement	0.020	0.024
	(0.008)	(0.010)
High profits	0.024	0.016
	(0.007)	(0.010)
Modern technical equipment	0.009	-0.015
	(0.007)	(0.010)
Overtime supplement	0.001	0.001
	(0.000)	(0.000)
Export	-0.004	0.023
	(0.008)	(0.012)
Establishment-average worker characteristics:		
Average female	-0.211	-0.219
	(0.234)	(0.031)
Average age	-0.001	0.002
	(0.001)	(0.002)
Average unskilled blue collar	-0.781	-0.907
	(0.065)	(0.161)
Average low skilled blue collar	-0.857	-1.034
	(0.065)	(0.163)
Average highly skilled blue collar	-0.609	-0.889
	(0.108)	(0.184)
Average white collar	-0.614	-0.670
	(0.065)	(0.160)
Average foreigners	-0.211	-0.022
	(0.024)	(0.085)
Propensity score	0.002	0.004
	(0.000)	(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

Notes: see Notes to Table 2a.

Table 3: 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)

Table 3 (cont.)

Collective agreement:				
on sector level	0.062	0.061	0.111	0.050
	(0.014)	(0.010)	(0.069)	(0.014)
on establishment level	0.087	0.065	0.129	0.107
	(0.018)	(0.014)	(0.074)	(0.020)
Payment above collective agreement	0.005	0.024	-0.006	0.035
	(0.010)	(0.008)	(0.023)	(0.009)
High profits	0.038	0.024	-0.010	0.019
	(0.010)	(0.008)	(0.025)	(0.010)
Modern technical equipment	0.022	-0.005	0.062	-0.015
	(0.010)	(0.008)	(0.033)	(0.011)
Overtime supplement	0.001	0.001	0.000	0.001
	(0.000)	(0.000)	(0.000)	(0.000)
Export	-0.027	0.006	0.013	0.006
	(0.010)	(0.009)	(0.038)	(0.013)
Establishment-average worker characteristics:				
Average female	-0.296	-0.225	-0.247	-0.140
	(0.031)	(0.023)	(0.092)	(0.031)
Average age	0.006	0.000	0.005	-0.001
	(0.002)	(0.001)	(0.005)	(0.002)
Average unskilled blue collar	-5.684	-0.570	-4.848	-0.430
	(7.300)	(0.313)	(15.278)	(0.305)
Average low skilled blue collar	-5.770	-0.663	-4.848	-0.520
	(7.301)	(0.313)	(15.276)	(0.306)
Average highly skilled blue collar	-5.935	-0.423	-4.909	-0.136
	(7.301)	(0.324)	(15.278)	(0.319)
Average white collar	-5.555	-0.381	-4.617	-0.244
	(7.300)	(0.312)	(15.276)	(0.305)
Average foreigners	0.044	0.068	0.367	0.211
	(0.037)	(0.036)	(0.156)	(0.063)
Propensity score	0.002	0.003	0.000	0.002
	(0.000)	(0.000)	(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

Notes: see Table 2a.

Table 3: 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)
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)

Table 3 (cont.)

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

Notes: See Notes to Table 2a.

Table 4: 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	0.122	0.104	0.086
	(0.001)	(0.001)	(0.001)	(0.001)
Collective agreement at sector level	0.071	0.058	0.050	0.038
	(0.001)	(0.001)	(0.001)	(0.001)
Collective agreement at establishment level	0.077	0.075	0.070	0.060
	(0.001)	(0.001)	(0.001)	(0.001)
Pseudo- R^2	0.43	0.42	0.43	0.44
Males:				
Works council	0.110	0.096	0.080	0.067
	(0.001)	(0.001)	(0.001)	(0.001)
Collective agreement on sector level	0.067	0.056	0.047	0.033
	(0.001)	(0.001)	(0.001)	(0.001)
Collective agreement on establishment level	0.080	0.079	0.072	0.059
	(0.001)	(0.001)	(0.002)	(0.001)
Pseudo- R^2	0.44	0.43	0.44	0.45
Females:				
Works council	0.189	0.174	0.145	0.120
	(0.002)	(0.002)	(0.002)	(0.002)
Collective agreement at sector level	0.073	0.058	0.047	0.041
	(0.002)	(0.001)	(0.001)	(0.002)
Collective agreement at establishment level	0.064	0.059	0.056	0.058
	(0.002)	(0.002)	(0.002)	(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 2a.

Table 5: The Determinants of Tenure: The Card/de la Rica Model

	All workers		Males		Females	
	(1)	(2)	(3)	(4)	(5)	(6)
Works council	1.566	-2.873	1.538	-3.101	1.519	0.037
	(0.230)	(1.903)	(0.270)	(2.244)	(0.245)	(2.209)
Predicted (log) wage*works council	-	1.064	-	1.086	-	0.372
		(0.453)		(0.526)		(0.561)
Worker characteristics:						
Gender (female)	-0.521	-0.251				
	(0.101)	(0.135)				
Seceduc2	-0.233	-0.242	-0.163	-0.169	-0.794	-0.799
	(0.203)	(0.203)	(0.237)	(0.236)	(0.181)	(0.182)
Terteduc1	-2.927	-2.771	-3.232	-3.063	-2.607	-2.557
	(0.326)	(0.330)	(0.390)	(0.399)	(0.249)	(0.258)
Terteduc2	-2.387	-2.521	-2.615	-2.748	-2.539	-2.588
	(0.394)	(0.403)	(0.519)	(0.527)	(0.239)	(0.253)
Polytechnic	-3.440	-3.676	-3.606	-3.840	-3.194	-3.272
	(0.315)	(0.346)	(0.353)	(0.386)	(0.267)	(0.293)
University	-4.136	-4.516	-4.319	-4.698	-3.784	-3.915
	(0.375)	(0.435)	(0.418)	(0.490)	(0.323)	(0.373)
Unskilled blue collar	-1.240	-1.125	-1.175	-1.056	-0.811	-0.765
	(0.098)	(0.285)	(0.323)	(0.312)	(0.224)	(0.219)
Highly skilled blue collar	1.200	0.910	1.014	0.716	2.000	1.924
	(0.512)	(0.498)	(0.488)	(0.485)	(0.495)	(0.502)
White collar	0.022	-0.249	-0.084	-0.371	0.764	0.684
	(0.210)	(0.241)	(0.226)	(0.253)	(0.196)	(0.238)
Foreigner	-0.322	-0.280	-0.332	-0.290	-0.395	-0.379
	(0.193)	(0.193)	(0.215)	(0.215)	(0.209)	(0.209)
Establishment characteristics:						
western Germany	3.881	3.620	4.182	3.919	3.112	3.019
	(0.269)	(0.257)	(0.327)	(0.324)	(0.219)	(0.222)
size20_99	-0.605	-0.587	-0.212	-0.174	-1.078	-1.090
	(0.304)	(0.309)	(0.235)	(0.236)	(0.360)	(0.363)
size100_249	-0.583	-0.592	-0.172	-0.150	-1.001	-1.027
	(0.359)	(0.364)	(0.321)	(0.322)	(0.396)	(0.400)
size250_499	-0.254	-0.243	0.167	0.212	-0.764	-0.783
	(0.377)	(0.382)	(0.354)	(0.354)	(0.407)	(0.411)
size500_999	0.258	0.185	0.699	0.655	-0.314	-0.361
	(0.404)	(0.411)	(0.394)	(0.401)	(0.419)	(0.430)
size1000	1.664	1.547	2.450	2.361	0.172	0.111
	(0.550)	(0.545)	(0.583)	(0.401)	(0.493)	(0.430)

Table 5 (cont.)

High profits	0.411	0.388	0.625	0.604	-0.264	-0.273
	(0.409)	(0.410)	(0.454)	(0.455)	(0.317)	(0.316)
Modern technical equipment	-0.508	-0.557	-0.711	-0.760	0.080	0.062
	(0.415)	(0.411)	(0.471)	(0.465)	(0.323)	(0.319)
Overtime supplement	-0.001	-0.001	-0.002	-0.003	0.001	0.001
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)
Export	-0.895	-0.949	-1.007	-1.007	-0.295	-0.311
	(0.655)	(0.653)	(0.692)	(0.692)	(0.510)	(0.509)
Collective agreement:						
at sector level	0.431	0.419	0.308	0.329	0.637	0.632
	(0.282)	(0.282)	(0.361)	(0.384)	(0.209)	(0.210)
at establishment level	0.980	0.983	0.938	0.989	0.838	0.842
	(0.572)	(0.572)	(0.625)	(0.673)	(0.504)	(0.504)
Payment above collective agreement	0.197	0.134	0.345	0.300	-0.200	-0.226
	(0.583)	(0.585)	(0.709)	(0.763)	(0.338)	(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 6: The Determinants of Tenure: The Freeman/Medoff Tenure Model

	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 on sector level on 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 €). 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.
Sex	Dummy: 1 if worker is female, 0 otherwise.
Tenure	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.
Nationality	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.
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.
Paid overtime	Share of employees who receive paid overtime hours.
Export market	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: 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)

Appendix Table 2 (cont.)

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 on sector level on establishment level	 0.052 (0.009) 0.057 (0.013)	 0.064 (0.014) -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)

Appendix Table 2 (cont.)

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

Notes: Omitting for simplicity the remaining explanatory variables and denoting works council status by the dummy *Woco* and gender (female) by the dummy *d*, the estimated model in column (1) is given by $y_i = \beta_0 + \beta_1 d_i + \beta_2 Woco_i + \beta_3 Woco_i * d_i + \omega_i$, where the coefficient β_3 gives the wage premium earned by females in works councils establishments. In column (2) the model includes two dummies, one for each collective agreement status (sector and establishment level). The interpretation is analogous. See also the Notes to Table 2a.

Appendix Table 3: Wage Dispersion Within Establishments

Dependent variable	Standard deviation of individual wages		Coefficient of variation (i.e. standard deviation divided by the average wage)	
	(1)	(2)	(3)	(4)
Works council	-0.753 (0.032)	-0.811 (0.042)	-0.021 (0.000)	-0.017 (0.001)
Works council * Collective agreement (sector level)		0.126 (0.057)		-0.004 (0.001)
Works council * Collective agreement (establishment level)		-0.001 (0.101)		-0.022 (0.001)
Establishment characteristics:				
western Germany	9.602 (0.023)	9.604 (0.023)	0.043 (0.000)	0.044 (0.000)
size20_99	3.784 (0.085)	3.785 (0.085)	0.050 (0.001)	0.050 (0.001)
size100_249	6.025 (0.085)	6.025 (0.085)	0.068 (0.001)	0.068 (0.001)
size250_499	6.878 (0.085)	6.876 (0.085)	0.068 (0.001)	0.068 (0.001)
size500_999	8.389 (0.086)	8.387 (0.086)	0.072 (0.001)	0.071 (0.001)
size1000	9.222 (0.086)	9.218 (0.086)	0.063 (0.001)	0.063 (0.001)
Collective agreement at sector level at establishment level	 -0.113 (0.025) -0.654 (0.028)	 -0.206 (0.051) -0.626 (0.096)	 -0.012 (0.000) -0.021 (0.000)	 -0.010 (0.001) -0.002 (0.001)
Payment above collective agreement	0.460 (0.013)	0.460 (0.014)	-0.004 (0.000)	-0.004 (0.000)
High profits	0.256 (0.011)	0.256 (0.011)	-0.003 (0.000)	-0.003 (0.000)
Modern technical equipment	0.933 (0.014)	0.933 (0.014)	0.011 (0.000)	0.011 (0.000)
Overtime supplement	0.005 (0.000)	0.005 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Share temporary workers	0.094 (0.073)	0.086 (0.072)	0.061 (0.001)	0.059 (0.0008)
Export	1.481 (0.014)	1.480 (0.014)	0.019 (0.000)	0.019 (0.0002)

Appendix Table 3 (cont.)

Establishment-average worker characteristics:				
Average female	0.484 (0.053)	0.485 (0.053)	0.122 (0.001)	0.122 (0.001)
Average age	0.061 (0.003)	0.061 (0.003)	-0.001 (0.000)	-0.001 (0.000)
Average tenure	0.000 (0.000)	0.001 (0.000)	0.000 (0.000)	0.000 (0.000)
Average unskilled blue collar	6.358 (0.647)	6.358 (0.646)	0.262 (0.010)	0.263 (0.010)
Average low skilled blue collar	7.276 (0.650)	7.274 (0.649)	0.273 (0.010)	0.273 (0.010)
Average highly skilled blue collar	22.601 (0.703)	22.609 (0.702)	0.365 (0.011)	0.366 (0.0109)
Average white collar	21.240 (0.653)	21.239 (0.652)	0.269 (0.010)	0.270 (0.010)
Average foreigners	6.282 (0.080)	6.285 (0.080)	0.050 (0.001)	0.050 (0.0001)
Average Seceduc1	-3.398 (0.063)	-3.395 (0.063)	-0.021 (0.000)	-0.021 (0.0009)
Average Seceduc2	-2.086 (0.056)	-2.083 (0.056)	-0.034 (0.001)	-0.034 (0.0008)
Average Terteduc1	6.992 (0.442)	6.984 (0.442)	0.095 (0.008)	0.095 (0.008)
Average Terteduc2	13.327 (0.162)	13.231 (0.162)	0.048 (0.002)	0.048 (0.0017)
Average Polytechnic	17.377 (0.190)	17.372 (0.191)	0.072 (0.002)	0.071 (0.002)
Average University	35.327 (0.161)	35.332 (0.161)	0.170 (0.001)	0.169 (0.002)
R^2	0.73	0.73	0.40	0.40
F	73763.14	70596.71	15701.93	15031.42
N	1,277,676	1,277,676	1,277,676	1,277,676

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

Variable	All workers	Workers in establishments with works councils
(log) Wages	4.255	4.381
Works council	0.457	
Fraction females	0.314	0.308
Tenure (in years)	6.421	7.450
Age (years)	41.05	42.201
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		
on sector level	0.489	0.646
on establishment level	0.089	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

Appendix Table 4b: Establishments with 21-100 Employees – The Determinants of (Log) Wages, All Workers

	(1)	(2)	(3)	(4)
Works council	0.227	0.094	0.073	0.065
	(0.014)	(0.009)	(0.009)	(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

Notes: see Table 2a

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

	Men	Women
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

Notes: see Table 2a

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

	Seceduc 1	Seceduc2	Terteduc 1	Terteduc 2	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 2a

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

	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)
Men: Works council	0.044 (0.003)	0.048 (0.002)	0.051 (0.003)	0.052 (0.003)
Women: Works council	0.107 (0.005)	0.095 (0.005)	0.093 (0.004)	0.083 (0.005)

Notes: See Table 4.

Appendix Table 4f): The Determinants of Tenure (Card and de la Rica Model)

	All		Men		Women	
	(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

Notes: see Table 5.

Appendix Table 4g): Determinants of Tenure (Freeman/Medoff Tenure Model)

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

Notes: see Table 6.