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Dissonant Works Councils and Establishment Survivability

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Dissonant Works Councils and Establishment Survivability

Abstract

Using subjective information provided by manager respondents on the stance taken by the works council in company decision making, this paper investigates the association between a measure of works council dissonance or disaffection and plant closings in Germany, 2006-2015. The potential effects of worker representation on plant survivability have been little examined in the firm performance literature because of inadequate information on plant closings on the one hand and having to assume homogeneity of what are undoubtedly heterogeneous worker representation agencies on the other. Our use of two datasets serves to identify failed establishments, while the critical issue of heterogeneity is tackled via manager perceptions of works council disaffection or otherwise. The heterogeneity issue is also addressed by considering the wider collective bargaining framework within which works councils are embedded, and also by allowing for works council learning. It is reported that works council dissonance is positively associated with plant closings, although this association is not found for establishments that are covered by sectoral agreements. Taken in conjunction, both findings are consistent with the literature on the mitigation of rent seeking behavior. Less consistent with the recent empirical literature, however, is the association between plant closings and dissonance over time, that is, from the point at which works council dissonance is first observed. Although the coefficient estimate for dissonance is declining with the length of the observation window, it remains stubbornly positive and highly statistically significant. Finally, there is evidence that establishments with dissonant works councils are associated with a much higher probability of transitioning from no collective bargaining to sectoral bargaining coverage over the sample period than their counterparts with more consensual works councils.

JEL-Codes: J510, J530, J650.

Keywords: dissonance, works councils, plant closings, collective bargaining regime, rent seeking, learning.

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1 Introduction

In examining the association between works councils and on plant closings we revisit a neglected topic in an otherwise burgeoning empirical analysis of the effects of worker representation on firm performance. The topic is important because in the absence of such information what turns out to be focus on long-run survivors might impart upward bias to positive estimates of the worker representation effect. Alternatively, an absence of association in the presence of seemingly unfavorable effects on profitability might offer support to the notion that worker representation involves the capture of economic rents rather than impairing labor market efficiency.

Nevertheless, one should not underestimate the difficulties of arriving at meaningful estimates of the 'effect' of worker representation in its various guises on plant closings. In particular, here as elsewhere, it has proven difficult to allow for the heterogeneity of the institution of worker representation. As a result, estimates of the impact of works councils on establishment closings have typically taken the institution as a datum, even if allowing for institutional realities such as establishment size and collective bargaining regime, which factors assume importance in the German case because of the legal basis of the dual system.

In the present treatment, we use information on management perceptions of works council dissonance or disaffection to differentiate between types of works council. Specifically, circumstances in which company decisions must in general be taken in the face of opposition from the works council – as opposed to situations where the position taken by the works council either ultimately or indeed from the outset accords with that of management – provides our measure of dissonance. It is hypothesized that 'difficult' works councils elevate the bargaining problem and threaten plant survivability. It is further hypothesized that management may seek sectoral agreement coverage. This strategy can be thought of as a means to impose discipline and render antagonistic works councils less prone to engage in rent seeking behavior and with the ultimate goal of encouraging integrative bargaining on the lines envisaged by the collective voice model (Freeman and Lazear, 1995).[1]

The analysis is carried out using the extended observation window 2006-2015. Over this interval, we observe both works council and non-works council establishments, albeit over varying spells. The type of works council can be identified as dissonant (or cooperative) in 2006 while works council age is formally only available for 2012 (or 2014, see below), which allows us to assign works council age over a window of time. Although our establishment panel is obviously unbalanced, we are able to compare dissonant with non-dissonant works councils, as well as establishments with and without works councils of either type, controlling for observable establishment characteristics. In addition to type of collective wage agreement, the latter include establishment age, workforce composition, foreign ownership, state of technology, establishment size, sector/industry affiliation, and location (by states or *Länder*), inter al. In our sample, works council status is held fixed, that is, establishments either retain their works council status or non-works council status throughout. However, we do allow for changes in collective bargaining coverage as we want to examine the

association between works council dissonance and collective bargaining transitions. Our sample contains both continuing and newly founded establishments.

In addition to our focus on the impact of works council type on survivability, and the role of collective agreements in this regard, we also examine within the framework of our model the recent argument that the dialogue between works councils and management is likely to improve over time (e.g. Jirjahn et al., 2011). To this end, we initially use a simple works council age argument for the 2011-2015 window. However, as this strategy precludes the deployment of a dissonance variable, we then construct a rolling window in which works council age is necessarily increasing, thereby allowing us to determine the dynamic dimension of dissonance in a full model setting. Further, we revisit the collective bargaining theme by examining collective bargaining transitions by works council type. In particular, we are interested in whether it is the case that establishments with dissonant works councils are more likely to transition from an absence of collective bargaining into sectoral agreement coverage than their counterparts with more consensual councils.

The plan of the paper is as follows. In Section 2 the sparse literature on plants closings is reviewed and set within the broader German works council literature to underscore the need for more work on the heterogeneity of the institution. The two data sets used in this inquiry – namely the IAB Establishment Panel/*Betriebspane*l and the Establishment History Panel/*Betriebs-Historik-Panel* – are then described in Section 3, which also outlines our modeling strategy and specific hypotheses. Our detailed findings are presented in Section 4 according to the three broad themes alluded to earlier. Section 5 summarizes our findings and enters a number of important caveats on causation as well as recommendations for future work in this area.

2 Literature Review

Research into the association between works councils and plant closings in Germany is the neglected stepchild in what is now a large works council and firm performance literature.[2] The closings issue has been of somewhat greater interest in Britain and the United States where unions are the main vehicle of workplace representation and where negative union effects on firm performance have more often been reported for the latter country and in earlier times at least for the former nation as well. The corollary is that works councils have enjoyed a generally more favorable theoretical and empirical position reputation than unions per se and their association with plant closings may have attracted less attention as a result. Be that as it may, neither the British nor the U.S. research on plant closings has uncovered a clear link between unions and plant closings. British studies either report that union recognition and the union wage differential are statistically insignificant correlates of plant closings (see, respectively, Machin, 1995, and Stewart, 1995) or that any well-determined positive association between unionism and plant closings is partial, and largely attributable to union decline/weakness (see, respectively, Addison et al., 2003, and Bryson, 2004). For its part, the U.S. literature is somewhat more mixed. One study using industry wide data finds no evidence that

powerful unions – as proxied by the size of the union premium or the closed shop – have any discernible impact on plant closings (see Dunne and Macpherson, 1994). Another study, using firm data, reports some significant direct effects of union density on closings, although union density has to exceed 60 percent, or twice the sample mean, before this effect dominates what is otherwise a negative influence of unions on plant closings (see Freeman and Kleiner, 1999). In sum, and taking differences in interpretation into account, the suggestion that unions actually push firms over the edge is contraindicated.

Although there is a small but growing German literature on the association between works councils and employment growth (on which more below), there are just two German studies of works councils and plant closings. Addison et al. (2004) provided the first analysis of plant closings in Germany using data from five waves of the Establishment Panel (*Betriebspanel*) of the Institute for Employment Research (IAB), 1996-2000. Probit estimates of the effects of works councils (and sectoral collective agreements) on plant closings were first run for all plants, using both pooled regression estimates and regressions of 1967-2000 closings on 1996 data. In both cases the coefficient estimates for the works council dummy were significantly positive at the 0.01 level. Although the estimate of the collective agreement argument was negative in sign it was statistically insignificant, and the same was true of its interaction with works council status. When the authors next allowed all the determinants of plant closings – and not just works council status – to vary by collective agreement status there was every indication of structural differences between covered and uncovered sectors. Yet this did not apply to the works council variable; that is, although its positive coefficient was stronger in the uncovered sector than the covered sector, the difference in the point estimates was not statistically significant. The basic estimating equation was then fitted to separate samples of establishments with either fewer than 50 employee or with 50 or more employees. The positive works council coefficient was now only statistically significant for the sample of smaller establishments, but again the difference between the point estimates for this variable in the two sectors was not statistically significant. Only when separate regressions were run by coverage and establishment size were material differences in works council impact detected; specifically, works councils were now associated with distinctly elevated closings in uncovered smaller establishments.

The second study of the relationship between works councils and plant closings by Jirjahn (2011) uses data for Lower Saxony from the four-wave Hannover Firm Panel (*Hannoveraner Firmenpanel*), 1994-97. Jirjahn argues that works councils may play a positive role in establishment survival by virtue of their unique voice function, although in practice any such pro-active effect may be negated by rent seeking behavior sustained by the bargaining power that accompanies codetermination rights. The direction of the impact of works councils on plant closings is said to hinge on interactions with the moderating factors of ownership type (specifically, a single independent establishment dummy) and collective bargaining coverage, along with the economic situation. Jirjahn first examines the determinants of plant closings using an all-establishment sample

for direct effects only. In his probit regression neither works council presence on the one hand nor collective agreement and single independent establishment status on the other are statistically significant. He then estimates the determinants of plant closings separately for single independent and multi-establishment firms. Beginning with single establishment plants, for a regression containing an interaction term between works councils and collective agreement, the coefficient estimate on the works council dummy is positive and statistically significant and that on the interaction term is negative and statistically significant. On net, the presence of a works council is associated with a 10 percentage point higher probability of closure if the establishment is uncovered. If it is covered, however, the overall works council effect is a wash. For multi-establishment plants, for regressions with and without the works council-collective agreement interaction term, the direct works council 'effect' is negative and statistically significant. For the regression containing the interaction term, there is no evidence to suggest that collective bargaining has a moderating role in a multi-establishment firms.

If works councils negatively impact firm performance this is likely to have a positive effect on plant closures, even if such evidence cannot by itself establish that works councils push firms over the edge. Perhaps the closest analogue to plant closings is employment growth. Past studies of employment growth have tended to find that worker representation in either unions or works councils is associated with lower employment growth (see, for example, Addison and Belfield, 2004; Addison and Teixeira, 2006). More recent research for Germany at least has either called into question the robustness of this negative association (with respect to unions) or contested the sign of the (OLS) association to begin with (for works councils). Thus, using the linked employer-employee data set of the Institute for Employment Research (LIAB) for the years 2000-2014, Brändle and Goerke (2018) find a negative correlation between being covered by a sectoral or a firm-level collective agreement and employment growth of about 1 percent per annum. However, although this result is robust to the existence of works councils and the endogeneity of firm survival, inter al., it is not robust to estimation via panel methods. Indeed, based on difference-in-differences specifications, the authors come down in favor of interpreting the negative correlation they report in cross section as most likely due to negative selection into collective bargaining, although this falls short of identifying a significant causal effect.[3]

One potentially important form of heterogeneity long recognized in the literature, albeit somewhat infrequent in application, has been works council type. Examples include studies using the NIFA-Panel by Frick (2001), Dilger (2002), and Nienhueser (2009). The NIFA-Panel is a survey of managers in firms in the mechanical engineering sector, 1991-1998. The fourth wave of the survey elicits information about the attitude of the works council with respect to technical and organizational changes. Specifically, management is asked to state which of the following answers best characterizes that attitude: (a) *most technical or organizational changes have to be enforced against the will of the works council*; (b) *sometimes it is difficult to covey the mutual firm and staff interests to the works*

council; (c) *technical or organizational changes are supported by the works council without reservation*; (d) *the works council does not consider technical or organizational changes as its concern and does not participate*; and (e) *the works council is not involved in such changes*. These categories may be labeled as, respectively, 'antagonistic,' 'difficult,' 'cooperative,' 'uninterested,' and 'excluded' and were entered as dummy variables in the first two of the three analyses identified above to determine the impact of works council heterogeneity on the use of HPWPs and personnel fluctuation/flexible working time/product innovation/profitability, repectively.[4] Relatedly, other studies have sought to describe the quality of the relationship between different types of employee representation and firms, drawing on firm-specific characteristics (see Jirjahn and Smith, 2006).

In addressing the heterogeneity issue, Müller and Stegmaier (2017) distinguish between *contextual factors* such as ownership structure and collective bargaining and *endogeneity problems* such as the quality of management. Their focus is upon the former and their principal concern is to explain why firms might resist works councils if, as many of the more recent studies purport to show, works councils have positive effects on many outcome indicators. Here the emphasis is on looking beyond mean effects. In particular, they deploy a median voter argument to argue that average positive effects may be produced by strong positive effects for a minority of firms but moderate to adverse effects for the majority who might plausibly be expected to organize resistance to works councils at the employer association level. In short, opposition to works councils may still be rationalized on economic grounds.

A final contextual heterogeneity issue concerns the possibility that there will be a change in the relationship between the works council and plant management over time. This was first suggested by the finding in the qualitative research literature that works councils were engaged in an ideological confrontation with employers in the 1970s and 1980s that subsequently dissipated and led to a more cooperative relationship (see, in particular, Kotthoff, 1994). *Vulgo*: antagonistic works councils may become more accommodating or inexperienced works councils may learn, both with favorable implications for firm performance. This notion that performance effects of works councils may change over time was formally examined by Jirjahn et al. (2011), using data from the Bonn Works Council Survey conducted by the Institute for SME Research (IfM Bonn)(*Institut für Mittelstandsforschung*), and based on a questionnaire addressed to the owner or top manager of establishments with 50 to 500 employees. The authors' dependent variables are fourfold: a bad relation between the two sides; a works council that is involved in decisions even where it has no legal powers; the log of sales per employee; and the average quit rate in the preceding year. The key independent variable is a quadratic in works council age, the survey providing information on the year in which the works council was introduced.[5] The authors' probit equations for the two industrial relations variables indicate that the probability of an adversarial relationship between the two sides declines with works council age while works council influence increases with age. Both improvements eventually reverse, pointing to what is termed a *participation life cycle*. For their part,

the performance equations – estimated by OLS for the productivity measure and tobit for quits – again indicate favorable effects of wage council maturation; that is, with productivity increasing in works council age and quits decreasing in works council age. In a more recent analysis of dynamic effects of works councils on labor productivity using the IAB Establishment Panel, Müller and Stegmaier (2017b) fail to observe any negative long-run effect.[6]

In the light of the issues raised by research into works council effects and dated nature of research on plant closings, our own treatment will pay attention to potential works council heterogeneity by focusing on type of works council, potential learning effects, and the contextual factor/moderating role of collective bargaining. It will consider plant closings from 2006 to 2015 using information from the leading establishment-level dataset for Germany.

3 Data and Modeling Strategy

The raw information is extracted from the *IAB Establishment Panel*, which as noted earlier is a large-scale representative survey dataset of German establishments sponsored by the Institute for Employment Research (IAB) of the Federal German Labor Agency. Initiated in 1993, it comprises some 15,000 to 16,000 establishment interviews per year, with a yearly continuation response rate of over 80 percent that provides a strong panel dimension. New establishments enter the survey in every wave to both compensate for non-responses/panel mortality and also to mirror firm demography (i.e. births and deaths). For a more detailed description of the IAB Establishment Panel, the reader is referred to Fischer et al. (2009) and Ellguth et al. (2014).

For the greater part of our analysis, we shall employ an unbalanced panel covering the years 2006 through 2015, comprising establishments with at least 5 employees in the private, for-profit sector. Two key dummy variables are generated in our study: works council dissonance and plant (establishment) closure. The former variable is based on question 85 of the 2006 IAB Survey and it is defined as equal to 1 if *management takes decisions usually against the point of view of works council*, 0 otherwise. Plant closure is our dependent variable, and is set equal to 1 if the establishment closes, 0 otherwise. The manner of its construction is next addressed.

In order to identify establishment closings, we link the *IAB Establishment Panel* with the Establishment History Panel (*Betriebs-Historik-Panel* or BHP) of the IAB, based on the common identification number. The BHP dataset comprises yearly cross-sections of all establishments in Germany that employ at least one employee subject to social security contributions as of June 30 in each year. The link between the *IAB Establishment Panel* and BHP allows us to apply the heuristics provided by Hethey-Maier and Schmieder (2010 and 2013) to identify genuine establishment closures (and rule out the restructuring and relabeling of firms). According to their procedure, it is possible to distinguish artificial from genuine establishment closures by additionally taking worker flows between establishments into account. On this basis, reported exits from the BHP data are consequently classified into seven categories: mere ID-changes, take-overs/restructurings, spin-offs,

small deaths, atomized deaths, chunky deaths, and reason unclear. For the purposes of our paper, only the small, atomized, and chunky death categories are classified as establishment deaths. We also use an additional filter, as inspection of the data shows that it is possible that, after a seeming death, the establishment in question may nevertheless be interviewed in the *IAB Establishment Panel* in subsequent years. In this light, we only allow for small exceptions: an establishment closure is therefore only identified as such if the year of death taken from the BHP either coincides with the year of the last interview of that establishment in the IAB Establishment Panel or is recorded in the year preceding that last interview.

In our modeling of establishment survival/failure we compare dissonant with non-dissonant works councils, as well as establishments with dissonant (and non-dissonant) works councils with establishments without works councils. To this end, we deploy simple pooled probit regressions (with clustered/establishment standard errors) in order to reveal the relevant correlational relationships present in the data. More formally, we run the model:

$$Pr\ (y_{it} = 1|\ X_{it}) = \Phi(X_{it}\beta), \qquad (1)$$

where y_{it} is the dichotomous dependent variable (closure) and X_{it} includes the works council type and all the establishment-level time-constant and time-varying control variables, as well as time (year) dummies and a constant. We note that we also implemented the random-effects panel probit model, given by $Pr\ (y_{it} = 1|\ X_{it}, u_i) = \Phi(X_{it}\beta + u_i)$, where u_i is additive in the $\Phi(.)$ function and represents the establishment's persistent unobserved traits, $\Phi(.)$ is the standard normal cumulative distribution function, and $u_i|X_{it} \sim N(0, \sigma_u^2)$. In this case, the (latent) intra-class (establishment) correlation, given by $\rho = \sigma_u^2/(1 + \sigma_u^2)$, indicates the relative importance of the unobserved effect u_i – or the correlation between any two observations in the same establishment (see, for example, Rodriguez and Elo, 2003). As the null of no presence of the unobserved effect is not rejected for our sample, our findings in Section 4 are exclusively based on the simple pooled probit model.[7]

Our underlying hypothesis is that the quality of the dialogue between management and works councils matters. Accordingly, we expect in particular to detect a positive association between works council dissonance and closings in the sample of works council establishments. Whether closings are also expected to be positively associated with dissonant works council establishments in the full sample (i.e. where establishments without a works council serve as the comparator) is more debatable but likely to hold as well. These two cases form hypotheses H1 and H2, respectively.

We also expect that works council dissonance in association with sectoral bargaining will be correlated with greater survivability than a stand-alone 'antagonistic or hostile' works council situation. This expectation forms hypothesis H3, and is also evaluated for separate subsamples, defined by collective agreement regime.

We next test the argument that learning and adjustment on the part of and between works councils and management may improve over time. The issue is first discussed using a restricted 2011-

2015 window, based on the raw survey information available in 2012 and 2014 (see the description given in Appendix Table 1). In this case, we group works council establishments in three categories according to the age of their works councils (less than 5 years, 5 to 10 years, and more than 10 years); the comparator is the no works council situation. The goal is to ascertain, for example, whether a 10-year old works council establishment is not only statistically different from an establishment without a works council but also from its 1 to 5-year old counterpart. Our expectation is that younger works councils will be associated with a higher probability of plant closure than the older counterparts by reason of their inexperience. This is hypothesis H4. However, in this framework it is not possible to examine whether age matters in the case of dissonant works councils, the reason being that, due to sample attrition, our constructed panel would by 2012 contain too few establishments with a dissonant works council. But we can examine this second issue by constructing a rolling window in which by design works council age is necessarily increasing. Our hypothesis in this case is that if 'learning' occurs we should expect a decreasing magnitude of the conditional correlation between works council dissonance and closings as the rolling window gets wider, yielding hypothesis H5.

Finally, as a supportive exercise, we examine collective bargaining transitions. Given that the interaction between a dissonant works council and sectoral agreement coverage is likely to increase establishment survivability *ceteris paribus*, we would also expect works council dissonance to be associated with increased transitions out of the state of no collective agreement coverage into sectoral agreement coverage. This constitutes hypothesis H6.

In testing hypotheses H1 through H6 we control for a number of establishment-level observables, including establishment age and establishment size, workforce composition (namely, the share of qualified employees, women, part-time workers, and fixed-term contract employees), foreign ownership, and the state of technology. Mortality rates among new firms are high for a number of reasons that include strong competition from incumbents and their dependence on costly external funding (see Caves, 1998). For their part, small establishments are expected to have higher exit rates for reasons that also include lower managerial ability than their larger counterparts.

The sign of the single establishment (versus multi-establishment) control variable is more difficult to predict. A member of a multi-establishment organization is likely to benefit from the advantages of being a part of a large organization, while at the same time it may be more exposed to within-organization competition in bad times. For its part, foreign ownership of a given establishment is expected to work in a similar manner (i.e. indexing the pros and cons of being a part of a presumably larger (foreign) organization), although an added factor here, alluded to in the wider performance literature, may be the difficulty of establishing and sustaining cooperation between management and the works council in such establishments for cultural and information reasons. Further, an establishment with a highly qualified workforce is expected to be more adept in adjusting to cyclical fluctuations, and similarly for any unit with state-of-the-art technology. A higher proportion of fixed-term contract workers is associated with reduced separation costs and, to this

extent, with a higher probability of establishment failure. However, if a higher proportion of such workers is also indicative of an ability to weather storm, then the opposite effect is also possible. The effect of a higher share of women and part-time workers, although likely to reflect other non-observables may also be expected to capture a low cost of closing the establishment on severance pay grounds. A full description of the dependent and control variables, and the corresponding summary statistics, are provided in Appendix Table 1.

4 Regression results

The first column in Table 1 evaluates the role of dissonance in works council establishments – again, situations in which management takes decisions that are usually against the point of view of the works council – in terms of plant closings. *Vulgo*: are dissonant works councils, and hence implicitly poor workplace relations, associated with higher rates of plant closings? The comparator is the non-dissonant works council, and the analysis is deployed over the 2006-2015 window. By construction, all establishments are necessarily observed in 2006, and are then followed longitudinally for a varying number of years, up to year 2015. In total, there are 3,933 establishments with a valid answer to the dissonance question, and they are observed on average for 4.25 years, giving a total of 16,710 establishment-year observations. For this subset of works council establishments, the mean of the dependent variable (closings) is just 1 percent.

[Table 1 near here]

As expected, larger and older establishments, and those with an updated technology have well-determined and negatively signed coefficient estimates, while the other control variables fail to achieve statistical significance in this particular sample. Our main variable of interest – works council dissonance – is positively associated with closings at the 0.01 level, which result offers confirmation of hypothesis H1. Interestingly, the interaction between works council and sectoral agreements is negative and statistically significant at the 0.05 level, an indication that the corresponding marginal effect is also negative, implying that the effect of a discrete change in the interaction term from 0 to 1 is negatively associated with closings.

In the second column of Table 1 we enlarge the sample to encompass establishments with *and* without a works council. In this case, the number of establishment-year observations increases to 79,395, while the number of units is 22,145. The mean of the dependent variable is clearly higher than in the first column, at 2.2 percent. For their part, works council establishments are still restricted to those units surveyed in 2006 that can be followed over time, while non-works council establishments belong to any survey year within the 2006-2015 window. Two works council dummy variables are now allowed in the model – dissonant works councils and non-dissonant works councils – with non-works council status being the comparator. Again, a dissonant works council is positively associated with closings, also at the 0.01 level. We have therefore confirmation of H2. The non-dissonant works council situation is in turn not statistically different from a situation where there is no works council.

The establishment-level size, age, and state-of-the-art technology show the expected signs and are statistically significant. All the other control variables, with the exception of the share of female and part-time employees, are statistically significant at conventional levels. The interaction between dissonant works council and sectoral agreements is negative as in the first column of the table, although on this occasion the coefficient estimate is not statistically significant. Somewhat surprising is the positive *Non-dissonant works council*sectoral agreement* interaction term, which is statistically significant at the 0.05 level. We interpret this result as indicating that a sectoral agreement in combination with works council presence is not a sufficient guarantee against the risk of establishment failure.

It is also worthwhile mentioning that if one ignores the distinction between dissonant and non-dissonant works councils and runs the model in the second column of Table 1 with only a single works council dummy, no statistically significant association is found; that is, the works council coefficient is not statistically different from zero at conventional levels. Dissonance is therefore a crucial aspect. A similar model run on the sample of newly founded establishments (i.e. those born in the 2006-2015 interval) also produced a statistically insignificant works council coefficient. The sample in the former (latter) case contains 91,603 (10,762) establishment-year observations and 26,120 (4,730) units. The details are provided in Appendix Table 1.

The role of the interaction between works council status and the type of collective agreement can be clarified by running the model in separate samples (i.e. by collective agreement regime).[8] Tables 2a through 2c provide the results of this experiment. Sample size is necessarily reduced a result (cf. Table 1), especially in the second column of Table 2c where the number of establishment-year observations is only 3,378.

[Tables 2a-2c near here]

Beginning with the subset of uncovered establishments in Table 2a, works council dissonance is associated with an increased probability of establishment closure that is significant at the 0.05 and 0.01 levels in the first and second columns of the table, respectively. The control variables in the first column of the table in general now show lower statistical significance. Unsurprisingly, in Table 2b we have the result that dissonant or antagonistic works councils are not associated with closings when they appear in combination with sectoral agreements. Indeed, in neither of the two columns of the table is the coefficient estimate of the dissonant works council variable statistically significant at conventional levels. This result confirms the finding in the second column of Table 1.

Finally, for those establishments covered by a firm-level collective agreement in Table 2c, we also observe a non-statistically significant relationship between closings and dissonant works councils. We refrain from drawing firm conclusions in this case as the estimation sample is rather small. Based on Table 2b, however, for which we have a sufficiently large sample, we may confirm hypothesis H3.

The role of works council age on plant closure is addressed in Table 3. As described in the data and modeling section, we start by looking at the 2011-2015 window, in which we can measure the age of each works council. As can be seen, none of the three works council age dummy variables (less than 5 years, 5 to 10 years, and more than 10 years) is statistically significant at conventional levels. Even if the sign pattern of the coefficient estimates is not inconsistent with the learning hypothesis, this falls far short of an endorsement of H4. Finally, we again control for plant level characteristics, and with the exception of the single establishment variable, they all display the expected signs (cf. Table 1, second column).

[Tables 3 near here]

The more pressing issue is to determine whether *dissonant* works councils evolve over time; that is, whether a bad relationship is largely a question of time and is eroded by learning as a result of which both players are increasingly willing to embrace cooperation. It will be recalled that works council dissonance is observed in 2006, while works council age is observed in 2012 (or 2014). Accordingly, the age of once-dissonant works councils would be available for just a few cases over the 2011-2015 interval. We circumvent this limitation by exploiting the panel dimension of our dataset. Specifically, we successively increase the length of the observation window, beginning with the 2006-2009 interval and extending it up to 2006-2015. By construction, then, the age of the works council (be it dissonant or non-dissonant) will increase as the window widens.

[Tables 4 near here]

The results of this procedure are given in Table 4. As can be seen from the table, the coefficient estimate of the dissonant works council variable is always positive and highly statistically significant. This finding indicates that the hypothesized positive relationship between works council dissonance and plant closings is indeed robust across all observation periods. That said, the series of positive coefficients, with exception of the final sequence, is decreasing with the length of the rolling window. Nevertheless, this time pattern of coefficients scarcely offers a ringing endorsement of a learning phenomenon and hence of H5.

The final issue is related to the finding that the positive relationship between works council dissonance and closings is 'moderated' by collective bargaining, seemingly being much reduced where the establishment is covered by a sectoral collective agreement. In particular, we wish to know whether there is any evidence that, conditional on observables, firms will likely seek coverage under a sectoral agreement to 'manage' a dissonant works council. Specifically, we investigate whether the presence of antagonistic works councils in establishments without collective agreement coverage is associated with a higher probability of transitioning from non-coverage to sectoral agreement coverage.

[Table 5 near here]

Observe that in this particular extension the dataset is organized in a wholly different fashion than heretofore. Here we are not pooling establishment-level observations over a given observation

window. Rather, we have a single observation per establishment, wherein we flag whether an antagonistic or cooperative works council is present and whether there has been any change in collective agreement status from 2006 to t_1, where t_1 is the last year in which the establishment is observed; $t_1 \in [2007, 2015]$. Given that establishments are either not covered by any type of collective agreement or covered by a sectoral or firm-level agreement, we end up with a total of six possible scenarios. To illustrate, the first scenario (Case 1) includes all establishments that are not covered by any type of collective agreement (either sectoral or firm level) in 2006 *and* that either remain uncovered or switch to a sectoral agreement. The dependent variable is then defined as equal to 1 if there is a transition from no coverage in 2006 to sectoral agreement coverage in t_1; 0 if the establishment is not covered by any type of collective agreement in both 2006 and t_1. The second scenario (Case 2), in turn, contains all establishments that are not covered by any type of collective agreement in 2006 *and* that either remain uncovered or switch to a firm-level agreement over the observation window; the dependent variable being defined in similar fashion, namely, as equal to 1 if there is a transition, 0 otherwise. And likewise for Case 3, in which establishments either switch from a sectoral agreement to no coverage *or* remain covered by a sectoral agreement, and Case 4, containing firm-level agreement stayers *and* switchers from a firm-level agreement to no coverage. Finally, the number of transitions from a firm-level to a sectoral agreement and from a sectoral to a firm-level agreement (Cases 5 and 6, respectively) is too small to permit estimation. These two cases are omitted from Table 5, which provides the full description of the relevant scenarios.

The regression results of this exercise are given in Table 5. As in previous experiments, we control for an extended set of establishment-level characteristics, all of which are dated at year 2006. Case 1 in the first column of the table tests hypothesis H6. It can be seen that establishments with a dissonant works council are indeed associated with the transition from no collective bargaining agreement to sectoral agreement status, a relationship that is statistically significant at the 0.05 level. For none of the remaining cases, however, do we detect any statistical evidence linking dissonant works councils with collective bargaining transitions. Hypothesis H6 may be said, therefore, to receive support.

5 Conclusions

The effect of worker representation on plant closings has received little attention in the literature. As far as unions are concerned, the Anglo-Saxon literature while not on balance reporting a favorable impact of unions on firm performance has nevertheless found little evidence to suggest that unions actually push firms over the edge. Works councils have been the cause célèbre of the German literature and, as the exemplar of collective voice, have increasingly been more favorably regarded in the modern studies of firm performance. In this regard, it might come as something of a surprise to learn that a 2004 study using a national sample of all establishments in Germany and a 2011 study of manufacturing establishments in Lower Saxony both report evidence of a positive association

between works council presence and plant closings in the late 1990s. By the same token, each study also reports moderating factors in the presence of which the positive association no longer obtains.

As the data in both studies are dated, coupled with new information on works council type that became available in the most important establishment survey – the *IAB Establishment Panel* – for 2006, the time is ripe for a reconsideration of the works council-plant closings nexus. This justification is underscored by a plethora of new studies pointing to substantial heterogeneity in the association between works councils and various aspects of firm performance. The hallmarks of the present treatment are therefore two-fold. First, we exploit for the first time the information contained in the 2006 *IAB Establishment Panel* on type of works council based on management's assessment on the attitude struck by the works council when workplace decisions are being made as either dissonant (i.e. there is opposition from the works council) or accommodating (where the attitude of the works council is consensual, either from the outset or ultimately). Second, we consider the role of key intervening or moderating factors suggested by the literature, as reviewed in section 2 of the paper.

Abstracting from the results for the base controls, our findings may be summarized as follows. First, beginning with the direct association between dissonance and plant closings for the all-establishment sample (where the reference category is absence of a works council), we find that establishments with dissonant (although not non-dissonant) councils are associated with significantly higher rates of plant closings than their works council free counterparts. (Note that unlike the earlier literature which used a simple works council dummy, there is no suggestion that works councils measured in this conventional way have any effect on plant closings.) Second, the direct association between sectoral agreements and plant closings is significantly negative, although the interaction term with type of works council is statistically significant for non-dissonant works councils alone. Further, upon rerunning the model by type of collective agreement – firm agreement, sectoral agreement, and individual/no agreement – the dissonant works council coefficient estimate was positive and statistically significant only for the absence of collective agreement case. Third, we attempted tests of the learning hypothesis, namely that inexperienced works councils learn with age and more profoundly so (perhaps) in the case of dissonant/antagonistic works councils. The evidence was underwhelming. The most we can say that is that when we estimate the association between dissonant works councils and plant closings using a rolling window, the magnitude of the *positive* works council coefficient estimate declined in step with the observation window in six out of seven sequences. Fourth, we examined collective bargaining transitions for works council establishments. Consistent with the finding that dissonant works councils are not associated with plant closings when they appear in combination with sectoral agreements, and conversely for situations in which there is no collective agreement, is the sole statistically significant transition observed in the data: compared with remaining uncovered, transitions from no coverage to sectoral bargaining coverage are very much more likely for establishments with a dissonant works council.

Perhaps the most immediate concern here is whether management's assessment of the works council reflects poor establishment performance that ultimately leads to failure. It would be advantageous in these circumstances to have information on the trust placed by the works council in management (Brown et al., 2015), and investigate plant failures in the context of low trust. The latter measure is less subject to a reverse line of causation running from emerging plant failure. Another possibility would be to examine differences between the assessment of each side of the other so as to form a measure of workplace dissonance or mutual distrust (see Addison and Teixeira, 2019). A final possibility is that employer resistance and attitudes towards works councils are grounded in short-term orientation and non-monetary incentives, in which case our reliance on managerial assessment to parse works councils may be misplaced.

Endnotes

1. This argument presupposes that employer perceptions are grounded in profit-maximizing behavior, and that reverse causation from unrelated difficulties (leading to subsequent plant failure) to the contemporary employer diagnosis is not a pressing cause for concern. For a critique of the former assumption, see Jirjahn and Mohrenweiser (2016), who argue that employer 'opposition' to works councils is primarily for other than economic reasons. For a broader examination of works council dissonance using in addition to employer perceptions those of the employee representatives (and the difference between them), see Addison and Teixeira (2019) who conclude that each dissonance measure is consistent in its effect on workplace performance.

2. For reviews of the performance literature, see Addison (2009); Müller and Stegmaier (2017a), Jirjahn and Smith, 2018).

3. However, in a study using the *Hannoveraner Firmenpanel*, Jirjahn (2010) presents results for employment change that are not significantly different from zero using OLS methods but positive and marginally statistically significant in a framework that seeks to control for the endogeneity of works councils. His treatment effects model assumes that works council incidence depends on the presence of "active owners" in the establishment. Jirjahn argues that where works councils are defensive agencies designed to protect the employees' quasi rents in crisis situations, OLS estimates of the employment effect of works councils will be biased downward by neglecting the greater likelihood of their formation at such times, thereby obscuring a positive effect of the agency on employment. The determinants of works councils and the determinants of employment growth are jointly estimated by maximum likelihood. Collective bargaining is reported to have a negative marginally significant direct influence on employment but a positive indirect impact by increasing he probability of observing a works council. The joint effect of works councils and unions on employment growth is estimated to lead to higher employment growth rates of approximately 5 percentage points. Note that the presence of active owners, the identifying variable in this treatment effects model, is negatively associated with the incidence of works councils, although it is not clear how this variable can be disconnected from unidentified business strategies adopted by active owners that impact employment growth.

4. In the third study, Nienhueser criticizes this strategy on the grounds that the five types are not mutually exclusive, while the first three questions can be construed as willingness (or otherwise) to cooperate and the last two might indicate passivity or exclusion (or otherwise). Specifically, he proposes an alternative typology based on a combination of willingness to cooperate and power, yielding four types of works council. See also Kotthoff (1994).

5. We note that Müller and Stegmaier (2017a: 14) observe that the authors' cross section analysis does not permit a distinction to be made between age and cohort effects.

6. By the same token, the negative productivity effect that they do observe for the first few years of a works council's life is not deemed causal; rather, it is said to reflect the tendency for works councils to be established at times of economic difficulty. Nevertheless, the interpretation of there being learning effects on the part of works councils stands.

7. Given that $\rho = 0$ is not rejected, the results from the random-effects probit model are virtually the same. The results are available upon request. Cox proportional hazards duration models were also implemented, albeit without any gain in insight. They, too, are available upon request.

8. We note that for any two continuous independent variables, x_1 and x_2, their interaction effect on the dependent variable y is given by the cross derivative of the expected value of y with respect to x_1 and x_2. Similarly, for any two dichotomous variables x_1 and x_2, the interaction effect is obtained by taking the corresponding discrete changes. For a linear model the interaction effect is simply given by the marginal effect. However, in the case of a non-linear model (the probit case), the marginal effect of the interaction term and the interaction effect are distinct and not necessarily of the same sign (see Ai and Norton, 2003).

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TABLE 1

Establishment Closure, Works Council Dissonance, and Collective Agreements Coverage, Probit Estimates, 2006-2015

Sample: Works council establishments interviewed in 2006 with a valid response to the dissonance question		Sample: All establishments (i.e. with and without a works council) (This sample includes all the establishments in the first column, plus non-works council establishments interviewed at any year between 2006 and 2015)	
Variable	Coefficient (s.e.)	Variable	Coefficient (s.e.)
Establishment size	-0.247*** (0.032)	Establishment size	-0.197*** (0.013)
State-of-the-art technology	-0.283*** (0.065)	State-of-the-art technology	-0.209*** (0.022)
Share of skilled workers	-0.055 (0.170)	Share of skilled workers	-0.172*** (0.044)
Share of women	-0.012 (0.197)	Share of women	0.021 (0.055)
Share of fixed-term contracts	0.535 (0.384)	Share of fixed-term contracts	0.262*** (0.073)
Share of part-timers	0.043 (0.209)	Share of part-timers	-0.032 (0.053)
Foreign owned	0.009 (0.105)	Foreign owned	0.103** (0.049)
Single establishment	-0.107 (0.069)	Single establishment	-0.082*** (0.030)
Establishment age	-0.339*** (0.092)	Establishment age	-0.306*** (0.023)
Works council type: (Reference: non-dissonant works council)		Works council type: (Reference: no works council)	
Dissonant works council	0.757*** (0.261)	Dissonant works council	0.623*** (0.238)
		Non-dissonant works council	-0.059 (0.079)
Collective agreement type: (Reference: no collective agreement)		Collective agreement type: (Reference: no collective agreement)	
Sectoral agreement	0.128 (0.093)	Sectoral agreement	-0.069** (0.028)
Firm-level agreement	0.190* (0.113)	Firm-level agreement	-0.021 (0.074)
Interaction terms:		Interaction terms:	
Dissonant works council*sectoral agreement	-0.830** (0.371)	Dissonant works council*sectoral agreement	-0.485 (0.325)
Dissonant works council*firm-level agreement	-0.591 (0.497)	Dissonant works council*firm-level agreement	-0.348 (0.469)
		Non-dissonant works council*sectoral agreement	0.186** (0.089)
		Non-dissonant works council*firm-level agreement	0.130 (0.130)
Number of observations Number of establishments Pseudo R^2 Mean of the dependent variable	16,710 3,933 0.1431 0.010		79,395 22,145 0.0919 0.022

Notes: The dependent variable is a 1/0 dummy equal to 1 if the establishment closes, 0 otherwise. The specification includes industry affiliation, location (*Land*), and year dummies. Clustered (establishment)

standard errors are in parentheses. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively.

TABLE 2a

Establishment Closure and Works Council Dissonance in Establishments without Collective Bargaining, Probit Estimates, 2006-2015

Sample: Works council establishments interviewed in 2006 with a valid response to the dissonance question		Sample: All establishments (i.e. with and without a works council) (This sample includes all the establishments in the first column, plus non-works council establishments interviewed at any year between 2006 and 2015)	
Variable	Coefficient (s.e.)	Variable	Coefficient (s.e.)
Establishment size	-0.293*** (0.104)	Establishment size	-0.188*** (0.018)
State-of-the-art technology	-0.059 (0.192)	State-of-the-art technology	-0.190*** (0.028)
Share of skilled workers	-0.258 (0.417)	Share of skilled workers	-0.182*** (0.055)
Share of women	-1.373** (0.549)	Share of women	-0.023 (0.067)
Share of fixed-term contracts	-0.525 (0.943)	Share of fixed-term contracts	0.172* (0.095)
Share of part-timers	0.628 (0.517)	Share of part-timers	-0.017 (0.066)
Foreign owned	0.042 (0.277)	Foreign owned	0.104 (0.064)
Single establishment	-0.087 (0.200)	Single establishment	-0.033 (0.042)
Establishment age	-0.362 (0.231)	Establishment age	-0.313*** (0.029)
Works council type: (Reference: non-dissonant works council)		Works council type: (Reference: no works council)	
Dissonant works council	0.867** (0.354)	Dissonant works council	0.628*** (0.236)
		Non-dissonant works council	-0.065 (0.080)
Number of observations	1,116		44,760
Number of establishments	387		14,078
Pseudo R^2	0.2343		0.0880
Mean of the dependent variable	0.027		0.026

Note: See notes to Table 1.

TABLE 2b

Establishment Closure and Works Council Dissonance in Establishments with a Sectoral Agreement, Probit Estimates, 2006-2015

Sample: Works council establishments interviewed in 2006 with a valid response to the dissonance question		Sample: All establishments (i.e. with and without a works council) (This sample includes all the establishments in the first column, plus non-works council establishments interviewed at any year between 2006 and 2015)	
Variable	Coefficient (s.e.)	Variable	Coefficient (s.e.)
Establishment size	-0.233*** (0.041)	Establishment size	-0.219*** (0.021)
State-of-the-art technology	-0.419*** (0.081)	State-of-the-art technology	-0.269*** (0.038)
Share of skilled workers	-0.040 (0.223)	Share of skilled workers	-0.182** (0.083)
Share of women	0.228 (0.252)	Share of women	0.108 (0.104)
Share of fixed-term contracts	0.617 (0.475)	Share of fixed-term contracts	0.428*** (0.124)
Share of part-timers	-0.034 (0.257)	Share of part-timers	-0.063 (0.098)
Foreign owned	-0.032 (0.140)	Foreign owned	0.161* (0.082)
Single establishment	-0.164* (0.089)	Single establishment	-0.153*** (0.048)
Establishment age	-0.274** (0.133)	Establishment age	-0.299*** (0.044)
Works council type: (Reference: non-dissonant works council)		Works council type: (Reference: no works council)	
Dissonant works council	-0.048 (0.237)	Dissonant works council	0.116 (0.233)
		Non-dissonant works council	0.148** (0.065)
Number of observations Number of establishments Pseudo R^2 Mean of the dependent variable	10,579 2,781 0.1606 0.010		29,442 9,505 0.1089 0.019

Note: See notes to Table 1.

TABLE 2c

Establishment Closure and Works Council Dissonance in Establishments with a Firm-level Agreement, Probit Estimates, 2006-2015

Sample: Works council establishments interviewed in 2006 with a valid response to the dissonance question		Sample: All establishments (i.e. with and without a works council) (This sample includes all the establishments in the first column, plus non-works council establishments interviewed at any year between 2006 and 2015)	
Variable	Coefficient (s.e.)	Variable	Coefficient (s.e.)
Establishment size	-0.622*** (0.109)	Establishment size	-0.213*** (0.048)
State-of-the-art technology	-0.350 (0.232)	State-of-the-art technology	-0.094 (0.108)
Share of skilled workers	2.624*** (0.717)	Share of skilled workers	0.480* (0.253)
Share of women	0.710 (0.799)	Share of women	0.324 (0.316)
Share of fixed-term contracts	0.762 (1.763)	Share of fixed-term contracts	-0.212 (0.401)
Share of part-timers	-0.037 (1.003)	Share of part-timers	-0.629** (0.321)
Foreign owned	-0.979*** (0.380)	Foreign owned	-0.439* (0.244)
Single establishment	0.109 (0.225)	Single establishment	-0.021 (0.122)
Establishment age	-0.427 (0.322)	Establishment age	-0.244* (0.129)
Works council type: (Reference: non-dissonant works council)		Works council type: (Reference: no works council)	
Dissonant works council	0.834 (0.520)	Dissonant works council	0.355 (0.428)
		Non-dissonant works council	0.076 (0.159)
Number of observations	968		3,378
Number of establishments	322		1,520
Pseudo R^2	0.3491		0.1536
Mean of the dependent variable	0.026		0.019

Note: See notes to Table 1.

TABLE 3

Establishment Closure and Works Council Age, Probit Estimates, 2011-2015

Variable	All establishments (i.e. establishments observed in the 2011-2015 interval, with and without works councils)
	Coefficient (s.e.)
Establishment size	-0.203*** (0.020)
State-of-the-art technology	-0.214*** (0.032)
Share of skilled workers	-0.188*** (0.066)
Share of women	0.057 (0.085)
Share of fixed-term contracts	0.345*** (0.114)
Share of part-timers	-0.165** (0.080)
Foreign owned	-0.014 (0.073)
Single establishment	0.024 (0.044)
Establishment age	-0.270*** (0.036)
Works council age: (Reference: no works council)	
Works council age_1	0.126 (0.118)
Works council age_2	-0.062 (0.115)
Works council age_3	-0.024 (0.062)
Collective agreement type: (Reference: no collective agreement)	
Sectoral agreement	-0.078* (0.041)
Firm-level agreement	0.055 (0.081)
Number of observations	42,288
Number of establishments	13,264
Pseudo R^2	0.1292
Mean of the dependent variable	0.019

Notes: See notes to Table 1. Given that the information on works council age is only available in 2012 (or 2014), the sample is restricted to establishments observed in the 2011-2015 interval, with and without works councils, ***, **, and * denote statistical significance at the .01, .05, and .1 levels, respectively.

TABLE 4

Establishment Closure and Works Council Age using a Rolling Window, Probit Estimates

	Observation window						
Variable	2006-2009	2006-2010	2006-2011	2006-2012	2006-2013	2006-2014	2006-2015
Works council type: (Reference: no works council)							
Dissonant works council	0.729*** (0.253)	0.697*** (0.250)	0.657*** (0.248)	0.656*** (0.247)	0.628*** (0.243)	0.618** (0.241)	0.623*** (0.238)
Non-dissonant works council	0.010 (0.093)	0.073 (0.087)	0.023 (0.086)	-0.014 (0.085)	-0.048 (0.083)	-0.065 (0.082)	-0.059 (0.079)
Collective agreement type: (Reference: no collective agreement)							
Sectoral agreement	-0.065 (0.041)	-0.069* (0.038)	-0.060* (0.036)	-0.064* (0.033)	-0.080** (0.033)	-0.077** (0.030)	-0.069** (0.028)
Firm-level agreement	-0.073 (0.096)	-0.022 (0.088)	0.008 (0.083)	0.0307 (0.078)	0.045 (0.074)	0.032 (0.072)	-0.021 (0.074)
Interaction terms:							
Dissonant works council*sectoral agreement	-0.371 (0.335)	-0.329 (0.331)	-0.412 (0.337)	-0.282 (0.314)	-0.298 (0.310)	-0.381 (0.317)	-0.485 (0.325)
Dissonant works council*firm-level agreement	-0.322 (0.500)	-0.313 (0.493)	-0.332 (0.489)	-0.332 (0.484)	-0.376 (0.473)	-0.386 (0.470)	-0.348 (0.469)
Non-dissonant works council*sectoral agreement	0.108 (0.107)	0.057 (0.100)	0.102 (0.098)	0.145 (0.097)	0.180* (0.095)	0.197** (0.093)	0.186** (0.089)
Non-dissonant works council*firm-level agreement	0.061 (0.166)	-0.008 (0.152)	-0.157 (0.153)	-0.059 (0.143)	-0.029 (0.139)	0.029 (0.134)	0.130 (0.130)
Number of observations	34,096	41,281	48,898	56,551	64,534	71,994	79,395

Notes: The specification includes industry affiliation, location (*Land*), and year dummies, as well as the set of establishment-level characteristics. Clustered (establishment) standard errors are in parentheses. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively.

TABLE 5

Collective Bargaining Transitions and Works Council Dissonance, Probit Estimates for Establishments with a Works Council, 2006-2015

Variable	CASE 1 The dependent variable is equal to 1 if there is a transition from *No CB* coverage in 2006 to *Scb* coverage in t_1; 0 if the establishment is not covered by *CB* in both 2006 and t_1.	CASE 2 The dependent variable is equal to 1 if there is a transition from No CB coverage in 2006 to Fcb coverage in t_1; 0 if the establishment is not covered by CB in both 2006 and t_1.	CASE 3 The dependent variable is equal to 1 if there is a transition from *Scb* coverage in 2006 to *No CB* coverage in t_1; 0 if the establishment is covered by *Scb* in both 2006 and t_1.	CASE 4 The dependent variable is equal to 1 if there is a transition from *Fcb* coverage in 2006 to *No CB* coverage in t_1; 0 if the establishment is covered by *Fcb* in both 2006 and t_1.
Works council type: (Reference: non-dissonant works council)				
Dissonant works council	+0.601** (0.257)	+0.230 (0.204)	-0.00340 (0.113)	+0.124 (0.288)
Number of observations (establishments) Pseudo R^2	483 0.296	445 0.169	1,659 0.157	292 0.194

Notes: In this exercise by construction all establishments have a works council in 2006. Works council status is fixed over the 2006-2015 interval. 2006 is the first year in which an establishment is observed, and t_1 is the last, with $t_1 \in [2007, 2015]$. The set of included regressors is the same as in Table 1, except in the case of industry affiliation which now comprises 17 industries. Sample size is too small in the case of transitions from *Fcb* coverage in 2006 to *Scb* coverage in t_1(Case 5) and similarly for transitions from *Scb* to *Fcb* coverage (Case 6). These two cases are therefore omitted from the table. *No CB*, *Scb*, and *Fcb* denote no collective agreement, sectoral agreement, and firm-level agreement coverage, respectively. Standard errors are given in parentheses. ** denotes statistical significance at the 0.05 level.

APPENDIX TABLE 1

Variable Definition and Establishment-level Summary Statistics

Variable	Definition	Mean (s.d.)
The dependent variable:		
Establishment closure	1/0 dummy: 1 if an establishment exits the administrative records gathered in the Establishment History Panel (BHP) of the IAB by means of a (small/atomized/chunky) "death." An establishment closure is only identified as such if the year of death taken from the BHP either coincides with the year of the last interview of that establishment in the IAB Establishment Panel or is recorded in the year preceding that last interview. See text for a description of the procedure.	0.022
The explanatory variables:		
Works council	1/0 dummy: 1 if a works council is present	0.218
Sectoral agreement	1/0 dummy: 1 if the establishment is bound by an industry-wide sectoral wage agreement	0.379
Firm-level agreement	1/0 dummy: 1 if the establishment is bound by a company-level wage agreement	0.057
Establishment size	The logarithm of the number of employees	3.431 (1.438)
Establishment age	1/0 dummy: 1 if establishment is older than 10 years	0.786
Single establishment	1/0 dummy: 1 if establishment belongs to a single establishment firm	0.757
Foreign owned	1/0 dummy: 1 if establishment is mainly or exclusively owned by a foreign entity	0.055
State-of-the-art technology	1/0 dummy: 1 if the overall technical state of the plant, machinery, and equipment of the establishment is state-of-the-art, compared with other establishments in the same industry (1 or 2 in the 1 to 5 Likert scale)	0.689
Share of women	Share of female employees	0.403 (0.291)
Share of skilled workers	Share of employees hired for complex tasks that require either a vocational training certificate, a corresponding measure of professional experience, or a university or college degree	0.699 (0.258)
Share of part-timers	Share of part-time employees	0.226 (0.246)
Share of fixed-term contracts	Share of employees with a fixed-term contract	0.054 (0.131)
Variable specific to the 2006 IAB Survey: (for establishments with a works council) (N=17,856)		
Dissonant works council	1/0 dummy: 1 if management takes decisions usually against the point of view of works council.	0.029
Variables specific to the 2011-2015 window	Assignment of the works council age is based on questions 75b and 79b of the 2012 and 2014 IAB Surveys, respectively. Based on the 2012 survey we assign the works council age in years 2011 through 2015; in case there is no information available from the 2012 survey, the information from the 2014 survey serves to allocate the age of the works council for those years.	
Works council age_1	1/0 dummy: 1 if the works council age is less than 5 years	0.030
Works council age_2	1/0 dummy: 1 if the works council age is 5 to 10 years	0.028

Works council age_3	1/0 dummy: 1 if the works council age is more than 10 years	0.266

Notes: With exception of two variables, works council dissonance and works council age at the foot of the table, the reported means refer to the estimation sample in the second column of Table 1 (N = 79,395 establishment-year observations). The sample comprises all establishments with at least 5 employees in the private, for-profit sector, grouped in 86 separate industries, located in 16 federal states (*Länder*).
Source: IAB Establishment Panel, 2006-2015.

APPENDIX TABLE 2

Establishment Closure and Works Council Presence, Probit Estimates, 2006-2015

	Sample: All establishments, with and without works councils	Sample: Newly-founded establishments, with and without works councils
Variable	Coefficient (s.e.)	Coefficient (s.e.)
Establishment size	-0.192*** (0.012)	-0.127*** (0.027)
State-of-the-art technology	-0.217*** (0.021)	-0.136*** (0.045)
Share of skilled workers	-0.146*** (0.042)	-0.269*** (0.079)
Share of women	0.018 (0.053)	-0.125 (0.105)
Share of fixed-term contracts	0.263*** (0.071)	0.040 (0.121)
Share of part-timers	-0.047 (0.051)	-0.111 (0.098)
Foreign owned	0.077* (0.044)	-0.075 (0.086)
Single establishment	-0.082*** (0.027)	-0.109** (0.055)
Establishment age	-0.300*** (0.022)	
Works council type: (Reference: no works council)		
Works council	0.054 (0.051)	-0.093 (0.126)
Collective agreement type: (Reference: no collective agreement)		
Sectoral agreement	-0.073*** (0.028)	-0.050 (0.059)
Firm-level agreement	-0.026 (0.072)	-0.182 (0.164)
Interaction terms:		
Works council*sectoral agreement	0.007 (0.062)	0.014 (0.155)
Works council*firm-level agreement	-0.038 (0.103)	-0.080 (0.262)
Number of observations Number of establishments Pseudo R^2 Mean of the dependent variable	91,391 26,091 0.091 0.021	10,747 4,716 0.0637 0.053

Note: See notes to Table 1.