Strikes, Employee Workplace Representation, Unionism, and Industrial Relations Quality in European Establishments

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Abstract

This paper investigates the relationship between different types of workplace representation and strikes using the 2009 European Company Survey. It also examines the role of the workplace climate, union organization, and collective bargaining. Our principal finding is that works councils are associated with reduced strike activity. But this result is sensitive to the union status of work councilors: where union members make up a majority of works councilors any beneficial effect of the entity on strike incidence is no longer evident in the data. Not only do union-dominated works councils experience greater strike activity than their counterparts with minority union membership, but also more strikes than establishments with union workplace representation where union members are in a minority. Dissonance between the parties, as indexed by degree of divergence between the opinions of employer and employee representative survey respondents as to the state of industrial relations at the workplace, is associated with elevated strike activity. If our measure of dissonance is exogenous, this result suggests that industrial relations quality may be key to strike reduction independent of workplace representation. Finally, there is some indication that union density at the workplace is directly associated with strike incidence, as well as evidence that strikes are more likely when collective bargaining occurs at higher than company level.

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1. Introduction

The impact of workplace representation on firm behavior has long been discussed in labor economics and industrial relations at both the theoretical and empirical levels (Freeman and Medoff, 1984; Godard, 1992; Freeman and Lazear, 1995; Addison, 2009). Less discussed are the specific contributions of different types of institutional workplace representation such as works councils and joint consultative committees or union bodies. Whether it really makes a difference having one type or another, and ultimately whether having formal workplace representation matters at all, are the key issues to be examined in the present treatment (see also Forth et al., 2017).

The principal dependent variable considered here is strike incidence. We see strikes as an inverse indicator of the potential ability of workplace institutions to generate a favorable climate of employee-management relations or trust, an absence of which may in turn adversely affect plant-level productivity and financial performance. That strikes and the quality of industrial relations have consequences for firm performance have been confirmed in various studies (e.g., Kleiner et al., 2002; Krueger and Mas, 2004). But it is the determinants of strikes rather than their consequences – which may be smaller because of the spillover effects of industrial action – that assume center stage here. Other salient features of this inquiry into strikes are union organization, direct measures of the quality of industrial relations, the architecture of collective bargaining, nation-state idiosyncrasies, and organizational changes within the firm.

Past studies of strikes have been hampered by small samples of firms, mostly pertaining to a single country. Cross-country evidence on union organization and strikes is sparse, and that between the institutions of employee workplace representation and strikes more so. This parochialism reflects the lack of cross-national datasets or even sufficiently comparable national datasets. By contrast with the strikes literature, country studies of workplace employee representation and company performance are considerably more extensive (e.g., Fairris and Askenazy, 2010), although cross-country comparisons are mainly qualitative. Quantitative comparative treatments, although certainly more common than in the strikes literature, are still rare. Examples include comparisons of Germany and Britain by Addison et al. (2000); of Norway and Britain by Bryson and Dale-Olson (2008); and of France and Britain by Bryson et al. (2011).

The data situation has improved with the availability of large-scale cross-national workplace datasets in the form of the European Company Surveys. Specifically, we shall use the Management and the Employee Representative Questionnaires of the 2009

European Company Survey (ECS), providing a sample of 30 countries – all the then 27 EU nations, plus Croatia, the former Yugoslav Republic of Macedonia and Turkey – and containing information on approximately 27,000 companies with 10 or more employees (see Riedmann et al., 2010).[1]

Use of the ECS permits a number of innovations to be introduced into the analysis of workplace representation and strikes. In the first place, it allows for a full characterization of employee workplace representation, identifying the presence of works councils (and analogous bodies such as joint consultative committees) on the one hand and union agencies on the other. Second, it permits a distinction to be drawn between works councils and union agencies in circumstances where both entities are formally present at the workplace. In this light, we shall use the notion of a 'prevalent' works council or a 'prevalent' union agency, based on the identity of the respondent in the component Employee Representative Questionnaire. Third, one can further differentiate between types of workplace representation using the notion of 'union domination,' as obtains when a majority of the employee representatives are members of a trade union. Fourth, we introduce a dissonance argument capturing a deviation in perceptions between the two parties as to the quality of industrial relations at the workplace. Our choice of this dissonance measure was designed to eliminate the line of causation in strikes analysis running from strikes to the industrial relations quality argument. Fifth, in addition to strike incidence, it is possible to construct ordered measures of strike duration, strike frequency, and strike intensity. Finally, despite the cross-section nature of the ECS, the data permit one to address the potential endogeneity of worker representation. To this end, we shall present our baseline model with specifications that initially use an instrumental variables approach followed by a multiple treatment effects methodology to tackle selection on observables.

The plan of the paper is as follows. Section 2 contains a survey of the theory with a bearing on worker representation and strikes, as well as a review of the sparse empirical literature using the new dataset, to investigate the association between employee representation and firm performance/strikes. Section 3 describes the unique dataset. There follows in Section 4 a presentation of our two-level mixed-effects ordered logit baseline model and robustness procedures. Section 5 reports our detailed empirical findings. Section 6 concludes.

2. Backdrop to workplace representation and strikes

2.1. *Theoretical considerations*

The theory of the effects of employee representation is fairly well developed. It can be traced to notions of incomplete contracting in which some mechanism has to be found to ensure that the parties to a contract that is implicit are motivated to honor its necessarily incomplete terms without recourse to constant bargaining/renegotiation with all the ensuing possibilities for opportunistic behavior that could dissipate the joint surplus of the firm. The literature illustrates how implicit contracts can cope with asymmetric information to make truth revelation the appropriate strategy by restricting the choices open to the firm while dealing with the enforcement problem through a reputation effects mechanism that exacts a stern price in the form of permanently higher wages for firms that renege on their promises (see the contributions of Rosen, 1994).

As initially developed there was no mention of worker representation in contract theory. The characterization of the union as a commitment device was first advanced by Malcomson (1983) in discussing a situation in which uncertainty in the firm of product demand shocks encourages the use of contingent contracts to allocate risk between risk-averse firms and workers. Yet such contacts are portrayed as unenforceable because neither the courts nor the workers can observe the state of the world. Enter the union which can provide workers with more accurate information about the state of nature. Coordinated action by the union permits workers to enforce an efficient, state contingent contract.

In sum, a prima facie case came to be made that worker representation can facilitate efficient contracts in situations where there is a long-term relation between the two sides but where employers' ex ante promises to take workers' interests into account are not credible or where the reputation effects mechanism offered by the market is weak. Interestingly in the light of what follows in the discussion of rent seeking, the union role in contract theory was most commonly invoked in the context of worker investments in firm-specific training, where *firms* might 'hold-up' workers by appropriating their share of the quasi-rents rents resulting from these investments.

However, the key theoretical construct in examining the union role is provided by the model of *collective voice.* As developed by Freeman and Medoff (1984), collective voice has a number of distinct components. Of these, the best known is the union role in providing information. The labor market context is important here. It is largely one of continuity rather than spot market contracting because of the on-the-job skills specific to the firm and the costs attaching to worker mobility and turnover. What mechanisms are

available to elicit information on worker preferences and sources of discontent in these circumstances? It is argued that given the public goods nature of the workplace, collective voice provided by the union outperforms individual voice (obtained either inferentially or directly via exit interviews). Unions collect information about the preferences of all workers and aggregate them to determine the social demand for such public goods. The expression of collective voice is expected to reduce quits and in turn by lowering hiring and training costs increase investments in firm-specific human capital. Lower quits may also occasion less disruption in the functioning of work groups.

In addition to information provision, the other main aspect of collective voice is governance. Freeman and Medoff (1984: 11) argue that this function is quite consistent with the contract-theoretic literature reviewed earlier. They contend that the response of a union specializing in information about the contract can prevent employers from engaging in opportunistic behavior. Workers may withhold effort and cooperation when the employer cannot credibly commit to take their interests into account. Fearing dismissal, they may be unwilling to invest in firm specific skills or disclose information facilitating pro-productive innovation at the workplace. The formation of a union and the introduction of a system of industrial jurisprudence is one means of protecting employees. In this way unions may generate worker cooperation, including the introduction of efficiency enhancing work practices. However, the threat of credible punishment implies bargaining power and in turn implies rent seeking behavior on the part of the union.

Subsequent development of the union voice model sought to accommodate the bargaining power problem. Before turning to this issue, however, we need to address the theme of dissatisfaction, and the strikes variable more directly. In discussing the reduction of quits the expression of voice in the collective voice model appears to emphasize dissatisfaction; that is, voice is described as directing attention to workplace problems, encouraging expressions of discontent, and keeping dissatisfied workers from quitting (Freeman, 1976: 367), even at the same time as good industrial relations are viewed in the model as key to improved productivity (Freeman and Medoff, 1984: 165). Furthermore, expressed worker dissatisfaction is recognized to be higher in union regimes (Freeman and Medoff, 1984: Chapter 12). Against this backdrop, modern empirical research has suggested that employee satisfaction and well-being have an important role in determining establishment productivity (Böckerman and Ilmakunnas, 2012), a relationship that is also reported in lab experiments linking human happiness and human productivity (Oswald et al., 2015). *Vulgo*: Might not voice be more pro-productive if it

came from more satisfied workers?[2] Two responses may be made to this criticism. First, the architects of collective voice interpret the difference in expressed complaints between union and nonunion labor as an expression of democracy rather than as indicative of a true shortfall in satisfaction, the difference between 'true' and 'voiced' dissatisfaction reflecting the nature of the voice institution (Freeman and Medoff, 1984: 139). Second, other recent research has suggested that when one controls for the endogenous selection induced by the sorting of workers into unionized jobs, the material difference in job satisfaction between unionized and non-unionized workers no longer obtains or is much reduced (see Laroche, 2016, and the references contained therein). In short, a selection effect rather than a causal effect may characterize the relationship between union membership and dissatisfaction. Rather than dissatisfaction, distributional conflict (and mutual perceptions of the relationship between the two sides) may be the more relevant consideration(s).[3]

Next we need to briefly address strikes more explicitly. First, the presence of trade unions is often viewed as a prerequisite for strikes and there is a well-documented association between union organization and strike incidence, that is, between a capacity to strike and unions (e.g., Kaufman, 1982). There is nothing in the above to counter the notion that union organization or resource mobilization are relevant to strike incidence. Second, the exit-voice model ultimately hinges on the importance of good industrial relations.[4] This recognition finds a ready counterpart in the (macro) performance model of Blanchard and Philippon (2004) in which it is argued that the more unions and firms share a common economic model, or the more that they discuss the economic implications of different shocks, the faster learning and adjustment are likely to be. Bayesian learning is thus central to this model in which the effect of shocks on unemployment depends largely on whether and how fast they are perceived by unions. Blanchard and Philippon proxy industrial relations quality by strike intensity and report that countries with one standard deviation better quality had about 1 percentage point lower unemployment than the average OECD country in 1965-74 improving to some 2-2.5 percentage points less in 1985-2002. Accordingly, it may be argued that union regimes to the extent that are also characterized by good industrial relations should record lower strike activity. Blanchard and Philippon's reasoning is clearly consistent with distinct strike models that interpret withdrawals of labor as bargaining mistakes (e.g., Siebert and Addison, 1981).

Returning to the theme of bargaining power, subsequent development of the collective voice model has sought to accommodate rent seeking behavior. We refer to

Freeman and Lazear's (1995) purpose-built analysis of employee workplace representation; specifically, the works council and its codetermination or joint-governance power at the workplace. Freeman and Lazear argue that codetermination will be underprovided by the market because an institution that gives power to workers will affect the distribution as well as the size of the joint surplus.[5] Some limits have therefore to be placed on the bargaining power/potential rent seeking ability of works councils and for these authors the German institution fits the bill.

The content of collective voice is elaborated in this works council model. Workplace representation is seen as a continuum, ranging from information exchange through consultation to participation. Works councils with rights to information reduce economic inefficiencies by moderating worker demands in difficult economic circumstances. Thus, management's use of the works council as a communicator to workers about the state of nature can lead them to work harder in adverse states, whereas in the absence of credible information – equated with the requirement to disclose financial information – workers might be tempted to reduce the pace of work/withdraw labor. For their part, consultation rights can produce new solutions to the problems confronting the firm, by virtue of the non-overlapping information sets of the two sides and the creativity of discussion. Finally, participation rights offer the prospect of an improvement in the joint surplus by providing workers with enhanced job security that encourages them to take a longer-run view of the prospects of the firm. Otherwise, fearing dismissal, they may be unwilling to disclose information essential to innovation at the workplace.

These are the advantages. However, the same factors that cause the surplus to grow in the model also cause profitability to fall. Workers are depicted as demanding too much involvement because their share in the surplus continues to rise after the joint surplus is maximized, so that it is in turn logical for employers to resist works councils or vest them with little power. (There is also the issue of the direct and indirect costs associated with the functioning of a worker representation body.) Accordingly, some type of third-party regulation limiting bargaining power has to be found if the societal benefits of worker voice are to be realized. It is conjectured that a German-style system might allow a decoupling of the factors that determine the size of the joint surplus from those that determine its distribution. But of course the German system with its checks and balances is but one of many worker representation types, while within that country, as in other nations, works councils are not a datum (see, for example, Kotthoff, 1981; Jirjahn et al., 2011).

Nevertheless, although still open ended, the works council model is suggestive of a potentially more positive role for this institution than for analogous union bodies. Observe however that any assessment of this institution is not independent of unionism and other factors. For its part unionism is causally linked to strikes because unions have the often unique capacity to strike. Yet if it is union power that is the issue then, mistakes aside, unions should mostly achieve their goals without the need to strike, management recognition of that power leading to concessions and settlements.[6] However, to the extent that unions are not generally viewed as integrative bargaining institutions, there are grounds for expecting a positive relation between union density and strikes on enhanced capacity to strike grounds. Similarly, where the information and consultation body has strong links with unions at workplace level, the deliberative function of workplace representation may be attenuated as the distributive role is elevated. Moreover, multiunionism causes especial problems. Not only has it been linked to poor performance (e.g., Metcalf, 2003) but there is also a distinct literature linking multiunionism to higher strike activity (e.g., Akkerman, 2008).[7]

With respect to collective bargaining, there is a presumption in the economics literature in favor of company agreements, at least insofar as firm performance is concerned (e.g., Jimeno and Thomas, 2013). On the basis of that literature, and assuming that strikes do indeed have negative implications for productivity and profitability, the suggestion is that strikes will be higher when bargaining is conducted at levels higher than firm or company level. On the other hand, companies bound by a collective agreement reached at sectoral or branch-level may well experience fewer frictions between management and the workplace representative body precisely because distributional conflicts regarding the terms and condition of employment have already been resolved. This suggested pro-productive symbiotic relationship is most often encountered in the German case given its dual system of industrial relations (e.g., Hübler and Jirjahn, 2003; Addison et al., 2016), but even in that country the evidence is mixed. This result is to be expected pending investigation of the links between unions and works councils at workplace level.

Next, from the perspective of Pareto optimal accident models of strikes (see Siebert and Addison, 1981), we have also to consider the impact of changing workplace conditions. Our premise would be that the greater the change in working conditions, the greater the scope for mistakes and the higher strike incidence. Other arguments that may

be traced to the accident model include firm size and non-independent units, reflecting workplace and institutional complexity, respectively.

Finally, and now directly linked to the collective voice (institutional response) model, is the importance of a good working relationship between management and worker representatives, even if this is not guaranteed by the presence of workplace representation. Indeed, as we have seen the architects of collective voice see the manner in which the two sides interact as more central to performance than the worker voice instrument itself (Freeman and Medoff, 1984: 179).

2.2. A partial review of the ECS literature

The extant literature using the ECS is sparse and only one such study is formally devoted to the strikes issue. The other studies look at either economic performance or behavioral indicators other than strikes. Nevertheless, each informs the present treatment of strikes. At the outset we note that almost all studies are confined to a single cross section – the 2009 ECS – reflecting the difficulty of integrating the component manager and employee representative surveys in the case of the 2013 ECS, as was alluded to earlier.[8]

The first of two studies selected for review here is by Forth et al. (2017). It is notable in clearly distinguishing between trade union and works council representation at the workplace, as well as situations in which both agencies are jointly present. (Forth et al. also identify whether union or works council representatives were prioritized when seeking an employee representative, although unlike the present treatment they do not use this information in their subsequent analysis.) Most of the authors' investigation is given over to explaining the incidence of workplace representation across the European Union, although our focus here will be upon that part of their analysis investigating the association between the presence of union and works council representation and behavioral outcomes.[9]

Specifically, three binary behavioral outcomes derived from the management interview are examined: the climate of industrial relations as either 'quite strained' or 'very strained;' problems of low motivation among workers; and problems with staff retention. The authors regress their three binary indicators on trade union/works council representation and a full set of workplace characteristics. In a first specification, they consider the contribution of a simple presence of any trade union or works council representation as opposed to no workplace representation. In a second specification, they

replace this overarching measure with three categorical indicators, namely trade union representation only, works council representation only, and the presence of both union and works council representation. The result of the former exercise is that the presence of either form of representation is associated with a greater probability of observing a strained work climate, although workplace representation plays no role in influencing motivation or staff retention. Turning to the second specification, only the dual channel regressor is statistically significant; that is, workplaces with *both* works council and trade union representation are again more likely than workplaces without representation to have a strained climate but on this occasion less likely to report problems with staff retention. Forth et al. therefore conclude that only modest support can be adduced from this finding for (a British variant of the) exit-voice model.

Of the studies using the 2009 ECS, only Jansen (2014) examines strike incidence, and his focus is more upon various union organization arguments than workplace employee representation bodies per se. In fact, Jansen does not consider differences in types of worker representation in a single country, referring to all such bodies as "works councils." But given his emphasis on union organization factors (and the organizational power of unions in particular), Jansen not only considers the company's union membership rate but also the presence of multiunionism and union domination of works councils (circumstances in which a majority of works councilors are union members). Moreover, drawing on separate, non-ECS indicators, he also considers the effect of cross-national differences in overall union density, in the number of union confederations, and in union decentralization (defined as the inverse of the authority unions have over their local branches), together with their cross-level interactions first with the union membership rate, then with multiunionism, and finally with union-dominated works councils. It is hypothesized inter alia that, by reason of greater organizational resources, higher union density should be associated with higher strike incidence at company (and national) level, and that decentralization should have weakened the positive association between union density and strikes at national level.

Abstracting here from differences in national trade unions systems – other than to note the findings that density, number of confederations, and degree of decentralization are found to independently increase strike activity – and focusing therefore upon his analysis of company-level effects, Jansen reports that the likelihood of a strike is some 1.4 times greater where a collective agreement is negotiated at higher than company level. For their part, the proportion of union members in the workforce, multiunionism, and

union penetration of the 'works council' are all positively related with strike incidence. For example, companies in which trade union members make up more than one-half of the local works council are 1.3 times more likely to confront a strike than their counterparts where there is no union majority. Interestingly, however, there is no suggestion that multiunionism weakens the organizational capacity of union-dominated works councils.

The strength of the Jansen study resides in its formulation of concrete hypotheses regarding the associations between different types of union organization and strikes at company level and to recognize potential differences in national union systems in this regard, including the cross-level 'effects' of national indicators. Each issue will be addressed in what follows. Despite the insight offered by the notion of a union-dominated works council, however, it is clear that the works council argument itself is an aggregate of different types of formal workplace representation, including union agencies in addition to works councils proper. Furthermore, issues of endogeneity are neglected.

3. Data

This study uses the 2009 European Company Survey (ECS), the original file having been downloaded from the U.K. Data Service site at *https://www.ukdataservice.ac.uk*/. As mentioned earlier, it includes all EU-27 countries, plus Croatia (which joined the EU in 2013), the former Yugoslav Republic of Macedonia, and Turkey. The survey is conducted in two stages: the first is an interview with a senior manager, while the second comprises a shorter interview with an employee representative in only those establishments with an employee representation body. These two components are referred to as the Management (MM) Questionnaire and the Employee Representative (ER) Questionnaire. The latter constitutes a necessarily smaller sample, as an establishment may not have any workplace representation entity (or, even if an employee representative body – formal or informal – is present, the ER questionnaire may be missing either because the employee representative declines to answer or the manager respondent fails to provide the proper employee representative contact information). Thus, out of 27,160 establishments in the 2009 MM survey, no less than 13,708 (or 50.5 percent) reported an absence of any employee representation at the establishment level. Of those reporting an employee representative body, 6,569 units (or 47.9 percent) furnished a valid response to the ER questionnaire.[10]

Beginning with the MM questionnaire, the very first step consists of generating a proper employee representation code that maps institutions to establishments across countries. Given national idiosyncrasies, this is a critical aspect of our inquiry, as different assignment rules produce different employee representation types. Our initial procedure was therefore to generate a 1/0 dummy, taking the value of 1 if formal employee representation is practiced at the establishment, 0 otherwise. By formal employee representation is meant the presence of a trade union entity per se or a work council type of representation. Thus, in the case of the United Kingdom, for example, formal representation requires that there is some *recognized shop floor trade union representation* or a *joint consultative committee.* For its part, any ad hoc form of worker representation is classified as *informal*; one example being a *Delegado de Personal* in Spain. By definition, such entities do not constitute formal employee representation.[11]

A complete mapping of formal employee representation by country is given in Table A.1, which also documents further coding details, including the full reference to the original (raw) variables. Observe that in countries such as France and Italy, establishments are permitted to have a trade union or a works council-type agency, or both, whereas in Germany (Sweden) only a works council (trade union) representation is allowed. For countries in the former group it is possible to assign mutually exclusive worker representation agencies. This is obvious enough for establishments having only one type of representative body in situ even if both are possible – here the situation is no different in practice from the case in which only one type of representation is allowed. However, what of establishments with two institutions present but, as is always the case, only one worker representative is interviewed? All that is required in this case is information on the type of respondent. Our presumption is that if the person interviewed is a works councilor, then the works council may be assumed to be the leading institution. Conversely, if the respondent is a member of the trade union agency, then the union body can be thought of as the principal entity. We can therefore speak of mutually exclusive situations in which the works council or the union body is the *prevalent* form of worker representation, such that a prevalent works council refers to situations in which there is either a unique works council at the workplace or where the works council agency can be adjudged more influential than the corresponding union agency where both entities are present; and mutatis mutandis for a prevalent union. A prevalent works council and a prevalent union are then the selected categories in our regression analysis in Section 5, below.

By design, the questions in the MM and ER component surveys are separate with almost no overlap. In particular, the employee representation information is extracted from the MM dataset, while the information regarding employee organization at the workplace is exclusively based on the ER dataset. Matching is therefore immediate for the 2009 ECS, as the variables are provided in a single dataset with a unique establishment identifier.

The list of variables extracted from the MM and ER datasets is described in Table A.2. Beginning with the former survey, in addition to employee representation status, the variables include establishment size (given by the number of employees in 10 intervals), industry affiliation (11 groups), whether the establishment is an independent unit as opposed to being part of a multi-establishment organization, and whether it is in the public sector. In addition to these establishment characteristics, we deploy information on the type of collective wage agreement (4 categories, including no agreement) and measures of organizational change (4 types). A final subset of variables from the 2009 MM exploits information on the manager respondents' assessments of the quality of industrial relations at establishment level.

From the 2009 ER survey we (initially) extract three variables related to union organization, namely the number of unions represented at the establishment, union density at the establishment, and union membership of the employee representation body. Using the last argument, we generate a dichotomous variable that flags whether the employee representation entity is union dominated (set equal to 1 if trade union membership exceeds 50 percent). Accordingly, we can identify a union-dominated union agency, a union-dominated works council, or a worker representative entity of either type that does not have a union majority among its members (i.e., is nonunion-dominated), making up four possible cases. Observe that even if the workplace representation vehicle is designated as exclusively a union agency it does not necessarily follow that the majority of the employee representatives are trade union members.

A final subset of variables taken from the ER survey is drawn from the employee respondents' views of the state of industrial relations at the workplace. These are then used in conjunction with the corresponding question taken from the MM survey, to form a measure of disagreement/dissonance between the two parties as to the ruling state of industrial relations at the workplace. After experimentation, we constructed two dichotomous variables designed to reflect sharply divergent views of the parties, with either management claiming the industrial relations situation was very good/good and the

employee representative arguing to the contrary that it was hostile, or vice versa. The two variables are labeled Deviation/Dissonance_1 and Deviation/Dissonance_2, respectively, as described in Table A.2. Agreement between the parties to the effect that the work climate is unambiguously favorable provided the reference category.

Finally, we turn to our crucial strike variable. In the 2009 ECS, the ER survey inquires of respondents whether or not there have been (a) one or (b) more instances of industrial action in their establishments in the last 12 months and, in each case, whether the incident consisted of (i) a stoppage of work or strike of less than one day, (ii) a strike of one day or more, (iii) a refusal to work overtime, or (iv) some other actions. To simplify the notation let us flag (a) and (b) as _a and _b, and (i), through (iv) as _1, through _4, respectively. We have therefore the following two disjoint subsets, {(_a, _1), (_a, _2), (_a, _3), (_a, _4)} and {(_b, _1), (_b, _2), (_b, _3), (_b, _4)}.

Based on these two subsets, one fairly obvious construct that has found favor is to generate a *strike incidence* dummy that simply flags the existence (or otherwise) of a 'stoppage or strike,' irrespective of its duration (which in the case of stoppages is necessarily less than one day) and irrespective of its frequency (i.e. one or more than one instance). Accordingly, the generated strike *incidence* dummy is set equal to 1 whenever the respondent reports at least one of the following combinations (_a, _1), (_a, _2), (_b, _1) or (_b, _2). This will be our first and principal outcome measure, namely strike incidence.[12]

Given the structure of the questionnaire, one can also construct some alternative ordering of the strike events observed at the workplace. Although it is not possible to construct a continuous measure of strike intensity, frequency, or duration, one can in practice arrive at three informative indicators. In the absence of consensus in the strikes literature as to which strike measure to use as the dependent variable (see Stern, 1978), including disputation on whether strike incidence and strike duration display the same cyclical pattern (see Crampton and Tracy, 2003), we deploy these three additional strike measures to determine whether there is anything distinctive in the results for incidence. A full description of the procedures used in their construction is provided in the Appendix.

4. Modeling

In our regressions strike incidence is explained by specifying a two-level mixed-effects logistic model as follows:

$$\Pr(y_{ij} = 1 \mid X_{1ij},\ X_{2ij},\ u_j) = H(B_0 + B_1 X_{1ij} + B_2 X_{2j} + u_j) \qquad (1)$$

where $H(.)$ is the logistic cumulative distribution function and establishment i is nested in group (country) j, with $i, = 1, 2, \dots, I$, and $j = 1, 2, \dots J$. y_{ij} is the selected 1/0 outcome indicator. Omitting the establishment and country subscripts, X_1 and X_2 denote a vector of establishment- and country-specific characteristics, respectively; in particular, X_1 includes establishment size, industry affiliation, and type of workplace employee representation inter al., while X_2 may include any characteristic that is common to all entities in a given country. u_j denotes a set of random intercepts. The two-level mixed-effects logistic model is implemented using the *melogit* command in Stata 15.0, and, to simplify the interpretation of the results, we will only report the corresponding marginal effects, obtained by fixing the random effects at their theoretical mean (i.e. zero) and all control variables at their sample mean.

One possible extension of equation (1) is to allow for a random slope of, say, establishment characteristic x_{1k}, in which case the model becomes:

$$\Pr(y_{ij} = 1 \mid X_{1ij},\ X_{2ij},\ u_{0j}) = H(B_0 + B_1 X_{1ij} + B_2 X_{2j} + u_{0j} + u_{1j} * x_{1kij}) \qquad (2)$$

In particular, as shown in Section 5 below, we will check the sensitivity of our results to the introduction of a random slope for the public sector and union density arguments.

Given the general specification in models (1) and (2), some further clarifications are in order. In the first place, as was implicit in our earlier remarks, a distinctive technical component of our modeling strategy has been the construction of outcome measures additional to strike occurrence. That is, we shall subsequently replace the strike incidence dummy in models (1) and (2) with a measure of strike intensity (and duration and frequency). This in turn involves the use of a two-level mixed-effects ordered logit, with Y_{ij} now flagging a categorical and ordered variable. In the case of strike frequency, for example, 1, 2, 3 may denote 'no strikes,' 'one strike,' and 'more than one strike,' respectively.

Secondly, we experiment with different comparison groups. For example, once we draw a distinction between formal and informal worker representation, it is possible to contrast 'absence' of worker representation with any type of formal worker representation. All that is required in this case is simply to equate this 'absence' with the presence of 'informal' worker representation. The point here is that even if the presence of an informal body is small in percentage terms (2 to 3 percent, as shown in Table 1 by subtracting column (4) from column (5)), it is sufficiently sizable to gauge the likely impact of having no (formal) workplace representation at all.

Thirdly, it will be recalled that by being able to identify the worker representative interviewee, it is possible in practice to establish the prevalent type of formal workplace representation at establishment level. This key aspect allows us not only to uniquely contrast works council with union entities but also, as was noted above, to compare the presence of formal workplace representation with its absence.

Fourth, we use deviation from agreed best-practice workplace labor relations – where mutual agreement on there being good labor relations is the reference category – to proxy the quality of industrial relations. The hypothesis is that difference between the two sides as to the state of workplace relations are aspects of 'dissonance' which we regard as a symptom of less cooperative industrial relations at establishment level, likely reflected in a higher level of contestation. The measure may also reflect trust and asymmetric information if, as Blanchard and Philippon (2004) surmise, the quality of the dialogue between the two sides captures the speed of learning of labor. While we are reluctant to accept that lagged strikes provide an instrument for trust, we would observe that our dissonance measure has the related advantage of reducing endogeneity bias arising from the use of a one-sided or unilateral measure of quality.

Finally, we address the possible endogeneity of workplace employee representation. As a first step, we ignore union dominance of the workplace representation body and instrument works council/union representation status. The selected instrument is a 1/0 dummy variable taking the value of 1 if there exists any performance-related elements of pay for staff other than top management. The variable is presumed to be correlated with the works council/union representation, but not with the selected outcome (strike incidence).

Our use of performance-related pay as an instrument for works councils has a basis in our earlier theoretical remarks. To the extent that the pay practices in question are of a traditional (individual) payment-by-results type, their workplace setting is the reverse of that envisaged under implicit contract theory/governance models and the collective voice mechanism. Further, to the extent that works councils are the ultimate institutional vehicle of collective voice – beyond union representation per se – then the implication is that traditional individual payment-by-results schemes will not only be less practiced in prevalent works council regimes than in workplaces without worker representation but also in those with prevalent union workplace representation. (It is recognized that unions have historically opposed payment be results but the relevant issues here are, firstly, the backdrop of the integrative as opposed to distributive nature

of bargaining under works councils and, secondly, the effect of union decline on the ability to oppose payment by results.) Of course, if performance related pay instead takes on the less traditional form of a high performance work practice, then the latter may either complement or substitute for workplace representation of either type.[13]

Turning to the exclusion restriction, we anticipate no differential effect of conventional payment-by-results on strike incidence. Note that the issue here is not one of whether payment-by-results occasion more work stoppages – associated, say, with the periodic renegotiation of the piece rate – but rather one of whether there is any incremental effect of payment-by-results on strike incidence in prevalent works council regimes beyond that contributed by the differential (i.e., lower) incidence of incentive pay in that particular workplace representation regime. Alternatively put, we anticipate that a given payment by results scheme will have the same effect on strikes in either regime. Familiarly, then, the performance-related pay variable should have no effect on strikes beyond its implied impact arising from differential use in the two regimes.

Our implementation of the instrumental variable approach uses the Conditional Mixed-Process (CMP) software (Roodman, 2011), which is well-suited to situations where right-hand-side observables include endogenous variables. CMP fits seemingly unrelated regression (SUR) models of a large family, including the case of a categorical left-hand-side variable and hierarchical (i.e. multi-level or clustered) data as in our case. In the presence of an endogenous variable, and given the availability of a valid instrument, the simultaneous system becomes a recursive system, similar to a two-stage least squares regression, the first-stage being given by the choice of works council status and the second by the strike incidence equation. We will test for the correlation in the error term across the first- and second-stage equations, where statistical significance denotes endogeneity in the system.

We also address endogeneity within a multiple treatment effects framework. In this case, we compute four potential treatments where treatment *t* can assume the values 0, 1, 2, and 3, denoting a nonunion-dominated union, a union-dominated union, a nonunion-dominated works council, and a union-dominated works council, respectively. For each establishment in the sample, therefore, we have one observed outcome and three potential outcomes, with the corresponding weights being given by the inverse sample probability. Intuitively, the inverse probability weighting is undertaken to ensure that actual outcomes are compared with the proper counterfactual; that is, to ensure that the difference in means between treated and untreated establishments is not simply a

difference between observed outcomes that would necessarily generate a bias in the presence of an endogenous variable.[14] With all the usual caveats, we would contend that the two procedures – instrumental variables and the multiple treatment effects – allow us to establish useful descriptive inference. They also permit the comparison of marginal effects and treatment effects using different methods.

The principal hypotheses examined in this paper might usefully be summarized at this point. First, and most importantly, works councils should be associated with reduced strike activity because of their informational, consultative, and (ultimately) participative/codetermination roles. Second, more is expected of works councils than union forms of workplace representation by reason of dampened rent seeking propensity. Third, union density should be positively related to strike activity on enhanced capacity to strike grounds. Fourth, union domination of workplace entities – identified with situations where more than one-half of the agencies' members are unionized – are more likely to be engaged in distributive bargaining and thence more prone to strikes. Fifth, the greater workplace dissonance, the less cooperative workplace industrial relations and the greater the likelihood of industrial conflict. Finally, and distinct from the above arguments, there are bargaining-theoretic reasons to suggest that other factors, such as changing workplace conditions and the degree of workplace and institutional complexity (as captured by firm size and multi-establishment entities), should be associated with higher strike propensity.[15]

5. The association between workplace employee representation and strikes

5.1. Workplace employee representation across Europe

As described in the data section, in order to make the generated trade union and works council dummies sufficiently comparable across a large sample of countries we have used the notion of 'formal' workplace employee representation. Table 1 gives the incidence of union agencies and works councils by country, using unweighted data. (Corresponding statistics using weighted data are available upon request.) As in some countries the two agencies may coexist at the same workplace, separate columns of the table indicate for each country the percentage of establishments in which there is only a single formal representation agency (either a union entity or a works council, but not both) (see columns (1) and (2)), and the percentage of establishments with both types (column (3)). We also provide in column (5) information on the presence of any type of employee

representation (formal and informal), so that the incidence of informal representation can be easily derived by subtraction from column (4).

(Table 1 near here)

The last row of the table reports the overall, cross-country incidence of employee representation. Workplace representation in union bodies alone obtains in 14 percent of all establishments while representation through works councils alone is to be found in 18 percent of the cases (columns (1) and (2), respectively). Formal representation is found in almost one-half of all selected European establishments (column (4)). A comparison of the last two columns, reveals that informal representation amounts to a residual 2 to 3 percent.

The dispersion in the incidence of workplace representation across countries is wide. It ranges from more than 70 percent in Denmark, Sweden, France, Finland, and Sweden to less than 25 percent in Greece, Malta, Portugal, and Turkey. This heterogeneity is further demonstrated in the next subsection.

(Table 2 near here)

Table 2 uses the notion of prevalent or dominant employee workplace representation and distinguishes between a prevalent union and a prevalent works council agency. The last row entry of the table shows that, among establishments with a formal representation body, the split between the two cases is virtually equal at 24 percent. Taking into account the result from Table 1 that the sample probability of an establishment having a formal employee representation body is about 50 percent, it follows that roughly one in four of the sample of European establishments will have a union agency, one in four a works council variant, while two in four will have no formal employee representation at all.

(Table 3 near here)

Using the distinction between prevalent works councils and prevalent union entities, in conjunction with information on the percentage of trade union members in these employee representation bodies, Table 3 gives the percentage of union-dominated agencies. Overall, 61 percent of all establishments with formal employee representation have a majority of union members among the employee representatives. Whenever there is a single entity at the workplace, union dominance is higher among establishments with a union entity (78 percent) than in establishments with a works council (35 percent). It is also clear that the works council agency tends to be more often dominated by the union

where both agencies are present vis-à-vis the situation where the works council is the sole representative agency (55 and 35 percent, respectively).

5.2. Strike incidence: main results

Table 4 reports the first set of regression results generated by our modeling strategy. Our baseline model implementing equation (1) is presented in column (2) of the table, while the baseline model excluding the interactions between union density and the three worker representation arguments – works councils, union-dominated works councils, and union-dominated union clubs – is given in column (1). The role of column (1) is simply to make transparent the direct effects of worker representation and is henceforth addressed only in passing.

(Table 4 and Figure 1 near here)

As a starting point, observe that country heterogeneity is dealt with by introducing random country intercepts. The log-likelihood ratio tests at the base of each panel confirm that the two-level mixed effects model is preferable to an ordinary logistic regression, while the variance component $\hat{o}_u^2$ is statistically significant, confirming that countries do differ in their strike incidence rate, other things equal. This variation is plotted in Figure 1, where countries are arranged by increasing order, with Italy, Portugal, France, and Greece in particular showing higher than average intercepts (or a higher than average strike incidence) in both survey years.

Returning to the set of worker representation and union organization variables, contained in the first block of the table, observe that due to the fact that in the estimation sample a formal worker representation body is necessarily present at the establishment – either through a (prevalent) works council or a (prevalent) union – our two-level mixed-effects logit model includes three workplace representation dummy variables. These respectively flag the presence of a works council, a union-dominated works council, and a union-dominated union entity. Accordingly, the coefficient on the first variable (works council) gives the nonunion-dominated works council 'effect' vis-à-vis the nonunion-dominated union body; the second gives the union-dominated works councils 'effect' vis-à-vis the works council without union domination, and the third gives the union-dominated union 'effect' vis-à-vis the non-union dominated union body.

From the second row of column (2), it can be seen that a nonunion-dominated works council agency is associated with a lower strike incidence than obtains where workplace representation is through a nonunion-dominated union agency or club. The

marginal effect is -0.06 and it is statistically significant at the .01 level. Recall from Table A.2 that the strike incidence mean is equal to 0.12. In contrast, the positive (and highly statistically significant) marginal effect of 0.08 for the union-dominated works council indicates that establishments in which a works council is dominated by union members have a higher incidence of strikes than situations in which there is no such majority. The marginal effect for a union-dominated union agency is in turn not statistically significant at conventional levels, suggesting union domination (a majority/minority of union members) is expected to be less of an issue whenever worker representation is in the form of a union delegation. Regarding the direct role of trade membership, there is every indication that higher union density at the establishment level implies a higher strike rate, but the magnitude of the marginal effect is small. Less obvious, however, is the role of the interaction between union density and workplace representation, with the two corresponding interaction terms failing to achieve strong statistical significance. Accordingly, we obtain the result that, once we control for the full set of workplace institutions, of the union organization arguments only the level of union density seems to play a discernible role. Union density will be further addressed in the context of the model specification in column (3).

A related issue is the recurring theme of multiunionism. However, the variable is not among the common set of regressors in Table 4. The reason is that information on number of unions at the workplace is missing in 15 percent of the cases, which would serve to further reduce the estimation sample. Nevertheless, in estimates not presented here (but available upon request), inclusion of a multiunionism variable failed to disturb either the signs or significance levels of the selected set of regressors included in column (1). At the same time, there was ringing confirmation of one statistical regularity in the strikes literature: the higher the number of trade unions at an establishment, the higher is strike incidence.

For their part, single establishment firms clearly experience a lower strike incidence rate than their multi-establishment counterparts, while collective agreements at higher than company level are associated with a greater incidence of strikes even though neither company-level agreements nor the mixed collective agreements display statistical significance at conventional levels. The public sector is also more strike prone than the private sector. In terms of industry affiliation, it appears that the *education* sector is more strike-prone than *manufacturing and energy* (the omitted category), while all the other sectors reveal a lower strike incidence albeit never achieving statistical significance at the

0.01 level. Furthermore, larger establishments are more strike prone. The coefficient estimates for industry affiliation and establishment size are not provided in the table but are available from the authors upon request.

In columns (3) and (4) of the table we take a closer look at the role of the public sector and union density by allowing for random slopes of the two arguments across countries, no longer assuming, as in column (2) (and column 1), the presence of a unique, public sector/union density term common to all countries. If for a given country strike behavior is driven by the particular profile of the public sector – recall from column (2) that strike incidence is clearly higher in the public sector by a 0.05 margin – then we should expect a different pattern of results in column (3) than for column (2). Equally, if union density ultimately flags country idiosyncrasies, then country slopes will play a role such that the results in column (2) may no longer hold. (Accompanying both exercises, we also plotted the corresponding country (random) slopes; a higher than average country slope indicating that the 'impact' of the variable on the strike rate is larger in magnitude than the average, all else constant.)

In particular, we see that allowing a country slope for either the public sector variable or establishment-level union density maintains the sign of the estimated marginal effects. It is true that the union density term alone is statistically weaker in column (4), and that the positive association between higher than company-level collective agreements and strikes no longer obtains, but the principal result from the baseline model – that the association between works councils and strike incidence is strongly negative where the entities are not union dominated – continues to hold if indeed not reinforced.

Country heterogeneity corresponding to columns (3) and (4) of Table 4 is shown in Figures 2 and 3, respectively. The random slopes in the former figure show less variability across countries than was the case for the random intercepts in Figure 1, whereas in the latter figure variability is perceptibly smaller across countries. Although on this occasion the country random intercepts are not shown, we note parenthetically that the country rankings earlier given in Figure 1 are largely maintained.

(Figure 2 and 3 near here)

Reflecting recent trends in the literature, we further analyze country heterogeneity by running our model for different country subsamples. We selected four subsamples divided into countries with a works council-type representation only (denoted S1); countries with a union-type representation only (S2); and countries with dual systems but in which the works council-type representation is found in more than 70% of the cases

(S3) or in which union-type representation is found in more than 70% of the cases (S4). We then tested whether our main findings reported in Table 4 continued to hold. Given the selected groups, one may for example test whether the work council in S1 and union delegation in S2 differ with respect to their association with strikes; or whether it is possible to obtain similar marginal effects by comparing establishments in countries in which works councils rule with their counterparts in countries where unions rule.

(Table 5 near here)

The findings are reported in Table 5. In the first column of the table we reproduce the results earlier given in column (1) of Table 4. Comparing these results with those for the country subsamples, it is apparent that both the sign and the magnitude of the estimated marginal effects are to a very large extent maintained in the latter. The principal exception is Case 4, which may be attributed to insufficient variation within the subset of S4 countries. Overall, union-dominated works councils are found to be associated with a 0.06 to 0.08 greater strike incidence, while both the works council and the union-dominated union terms behave as expected, as does the union density argument. As expected, we obtain lower statistical significance across the experiments, but there is no strong indication in the data that our findings in Table 4 are particularly sensitive to country subsets.[16]

Strikes may be regarded as bargaining failures, and in Table 6 we next introduce a *dissonance* argument into the baseline model. As was discussed earlier, the dissonance-augmented regression includes two dummies (Dissonance_1 and Dissonance_2) indicating situations in which management perceives the quality of industrial relations to be good or very good while the employee representative states that is to the contrary either bad or very bad, and conversely. It will be recalled that mutual agreement on there being a good or very good climate is the omitted category. In column (1) we see that the two variables are very much associated with strike incidence. Strike incidence is 0.05 higher in the case of Dissonance_1 and 0.02 higher in the case of Dissonance_2 than in the reference scenario, at the 0.05 statistical significance level or better. All the other reported coefficients remain very stable when compared with their counterparts in Table 4.

(Table 6 near here)

Next, columns (2) and (3) of Table 6 respectively introduce our organizational change arguments and an *absence* of workplace employee representation (as proxied by those interviewed establishments that report only the presence of informal representation).[17] Beginning with the estimates in column (2), note that organizational

changes at the workplace are defined as changes in the preceding three years and can therefore be reasonably assumed to pre-date the strike event(s). As hypothesized in the modeling section, our expectation is that such changes will be an autonomous source of strike variation. Consistent with our priors, changes in the remuneration system do seem to generate higher strike incidence. However, the three remaining indicators of organizational change fail to generate any statistically significant marginal effect at conventional levels.

Finally, the estimates reported in column (3) suggest that strike incidence is lower in both the presence of works councils and the absence of any (formal) employee representation compared with the union agency case. (Note that union agency is the omitted category as, by construction, we cannot distinguish between union- and nonunion-dominated informal representation.) That said, the coefficient estimate for the works council dummy is no longer statistically significant, which might suggest that formal worker representation – whether it is via a works council proper or a union club – may be of secondary importance to the issue of union domination.

5.3 Strike incidence: instrumental variable and multivalued treatment estimates

We now address the possible endogeneity of workplace representation, starting with an instrumental variable (IV) approach before implementing a multiple treatment methodology. In the IV approach it is simply assumed that all regressors are exogenous except works council/union status, where the instrument is given by a dichotomous variable taking the value of 1 if there is in the establishment any performance-related elements of pay for staff other than top management. The rationale for this procedure is discussed in Section 4, and is rooted in our theoretical remarks in Section 2.1.

(Table 7 near here)

Table 7 shows the results of the IV approach implemented using the CMP software. As described in the modeling section, CMP has the advantage of accommodating the presence of an endogenous regressor within a multi-level (clustered) data framework. First, for ease of comparison, we reproduce in column (1) of the table the estimates earlier reported in the first column of Table 6. Second, in column (2), we replicate the model now using the CMP command in Stata. This is to show that the CMP estimates conform to those generated by the original two-level mixed-effects logistic regression in column (1). Finally, in column (3) of the table are given the IV results using CMP. (The IV implementation within a multilevel mixed-effects model after Table 4 is

not available). The major finding is the confirmation of the union-dominated works council effect in the third row, as well as the nonunion-dominated works council effect in the second row. The corresponding marginal effects display a higher absolute magnitude than before. Also note that the selected instrument is statistically significant at the 0.05 level in the works council first-stage equation, and that the disturbances are statistically correlated across equations (in the last row). The IV approach therefore suggests that although endogeneity of workplace representation is a possibility, the nature of our findings in Tables 4 through 6 is unchanged.

(Table 8 near here)

The multiple treatment approach is documented in Table 8. Here, it is assumed that the presence of endogenous regressors can be mitigated by proper use of the set of observables. In particular, we seek to inversely weight individuals (i.e. establishments) for whom the probability of being 'treated' is observationally higher. The procedure involves the use of the *teffects* command in Stata. (Alternative multivalued treatment procedures were experimented with closely similar results.) It will be recalled that the multivalued or multiple treatment is defined as 0, 1, 2, or 3 if the establishment has, respectively, a nonunion-dominated union representation, a union-dominated union, a nonunion-dominated works council, or a union-dominated works council. The reported values in the table are the average treatment effect estimates; that is, they give the change in strike incidence generated by the corresponding treatment against the proper counterfactual. In the first row of the table, we have the estimated average treatment effect of union-dominated union representation versus a nonunion-dominated union agency (the default), while the second and third rows give the average treatment of having, respectively, a nonunion-dominated and a union-dominated works council representation versus the default. The fourth row generates the comparison between union domination versus nonunion domination of works council representation. Clearly, we obtain confirmation that union domination of works council is meaningful as both sets of estimates given in the third and fourth rows of the table are sizeable and statistically significant at the 0.05 level or better. By way of illustration, we see from the fourth row that union domination of a works council is estimated to result in a 0.06 greater probability of having a strike than the situation where there is no such domination. And as strikes are something of a rarity – the sample mean is 0.12 – the effects reported in Table 8 are tangible.

Our procedures are only as good as the data and much hinges on the underlying assumptions. The set of observables although extensive is certainly not exhaustive and perhaps more importantly our cross-section lacks any longitudinal dimension. Thus, although the results of the multivalued treatment are encouraging, we would refrain from claiming strong causal inference and prefer to emphasize the descriptively inferential nature of our results. The instrumental variable and the multiple treatment effects provide us with the opportunity of comparing marginal and treatment effects across a large variety of models. Against this backdrop, our findings appear quite robust.

6. Strike duration, strike frequency, and strike intensity

In the interests of completeness, in a penultimate exercise we next provide results from replacing the strike incidence with alternative strike measures, each of which is an ordered categorical variable.

For our strike duration, strike frequency, and strike intensity measures, three disjoint groups are generated; for example, in the case of strike duration, group 1 stands for 'no strikes,' group 2 for 'strikes for less than one day,' and group 3 for 'strikes of one day or more.' One obvious limitation is the reduction in the number of observations attendant upon some establishments with strikes being dropped from the sample, so that we are less likely to obtain well defined cutoff points in the corresponding ordered probit estimation than would otherwise obtain.

(Table 9 near here)

Our findings are given in Table 9 where, in the interests of parsimony, we only report the predicted probabilities of the three possible outcomes Pr1, Pr2, and Pr3 (allocated to groups 1, 2 and 3, respectively) for each outcome indicator. We also confine our attention to a comparison of two particular workplace representation types: the union-dominated works council and the nonunion-dominated works council. In the light of our preceding analysis, this comparison focuses on the most clear-cut case. The set of included regressors is the same as in column (1) of Table 5, and we note that all the estimated coefficients of the corresponding ordered logit model maintain their sign and statistical significance. Each of the cutoff points is also statistically significant.

Beginning with the strike duration case (Case 1), works council establishments with union domination are clearly less likely to be free of strikes than their nonunion-dominated counterparts, with probabilities of 0.780 and 0.933, respectively. Conversely, the probability of experiencing strikes for less than one day or strikes for one day or more

is visibly higher for union-dominated works councils, at 0.090 (versus 0.033) and 0.130 (versus 0.034), respectively.

These results carry over to Case 2, where the alternative strike measure is now given by the frequency variable (*strike_N*). Given that in the 'more than one strike' case we cannot for example distinguish a strike for 2 days from a strike for 5 days, the similarity between Cases 1 and 2 is not surprising. In any event, in looking at the sum of Pr2 and Pr3 (i.e. 0.220 and 0.200, respectively), it seems that union-dominated works councils are very slightly more likely to experience a longer duration of strikes than be involved in a higher number of strikes.

In Case 3, we offer a further refinement, this time in seeking to model strike intensity rather more rigorously. The case entry has four columns in each of which we have groups 1 and 2 defined as 'none' and 'one strike for less than a day,' respectively; whereas group 3 is differently defined in columns (2), (3) and (4) – as 'one strike for one day or more,' 'more than one strike for less than one day,' and 'more than one strike for one day or more,' respectively – thereby introducing some intensity ordering. In column (1), group 3 is defined as 'all else,' which is some amalgamation of the cases defined in columns (2) though (4). As explained in the data section, searching for higher precision in the outcome measure comes at the cost of an even smaller estimation sample, so that the number of establishments in groups 1 and 2 in columns (1) and (4) declines from 417 to 201.

Two main conclusions can be extracted from Case 3. First, there is confirmation that Pr1 is persistently smaller among union-dominated works councils, while Pr2 and Pr3 are always higher. Second, there is no indication that union-dominated works councils favor 'more than one strike for one day or more' (column (4)) over, 'one strike for one day or more' (column (2)). Rather, the evidence is to the contrary.

7. ER survey respondents versus non-respondents

The ER survey provides information on strikes, worker representation, and labor organization at the workplace, but is conducted for only a subset of the MM-interviewed establishments. Based on the MM interviews, we know exactly whether there is a formal or informal (or indeed no) worker representation. However, given that not all establishments with worker representation are actually interviewed, an unsettled issue is whether the reported results are driven by an unrepresentative set of respondents. By using the full sample of respondents and non-respondents, in a final exercise we test for

the presence of any obvious non-response bias arising from any unobserved self-selection mechanism that renders the set of ER respondents unrepresentative of the entire population of establishments with a formal employee representation body.

Our approach amounts to using a common set of regressors, necessarily extracted from the MM questionnaire, and then running an establishment performance model so as to establish the extent to which the non-ER respondents are statistically different from the ER respondents. To this end, we use a behavioral model linking establishment performance to a set of observed establishment characteristics. The simplified model in Table 10 specifies establishment economic/financial performance as a function of a common set of regressors that includes sector affiliation, establishment size, collective agreement type, single establishment and public sector status, as well as the prevalent form of employee representation. Establishment performance is based on the subjective responses of management; the actual variable being a dichotomous measure equal to 1 if the economic/financial situation of establishment is assessed by management as either very good or good, 0 otherwise.

(Table 10 near here)

Observe that labor organization arguments cannot be included in the model as information on these institutions is only available in the ER questionnaire. Similarly, as our dissonance indicator is not available for non-respondents, we elect to use the manager-respondent's perception of the quality of industrial relations at the workplace – even if this indicator is in principle more subject to feedback from performance than is dissonance from strikes.

The key argument is *ERint* which flags the situation where an employee representative has actually been interviewed. As can be seen from the table, this dummy variable is not statistically significant, suggesting that there is no statistical difference across the two groups of respondents and non-respondents. The model also indicates that the industrial relations climate and works council representation are positively associated with establishment performance. Assuming therefore that the set of regressors included in the performance model is not too alien to the explanation of the strike event, there is little reason to suppose that the results presented in the preceding tables are driven by an unrepresentative set of respondents.

8. Conclusions

Our main findings can be summarized as follows. Beginning with our baseline model, the principal finding is that a (prevalent) works council is associated with a lower strike incidence than the case in which the workplace representation operates through a union agency. That said, where union dominated (i.e., where a majority of works councilors are union members), works councils have a higher incidence of strikes than otherwise. As far as union organization is concerned, the connection with strikes is direct: union density at the workplace is associated with greater strike incidence. These and other results largely continue to obtain once we allow for random slopes of the public sector and union density arguments and indeed different country subsamples. Another important result is the relevance of dissonance between the parties (as indexed by degree of divergence between the opinions of employer and employee representative survey respondents as to the state of industrial relations at the workplace) to the strike outcome. In turn, the model containing establishments with *informal* workplace representation suggests that formal representation may ultimately be of secondary importance to union domination in explaining strike incidence.

Our principal result regarding union-dominated works councils carried over to estimations based on three additional strike measures, namely strike duration, strike frequency, and strike duration. Further, recognition of the potential endogeneity of formal workplace representation arguments did not blunt the thrust of our baseline models. Similarly, a separate analysis of establishment financial performance failed to provide any evidence of material nonresponse bias in the strikes analysis. Thus, the one constant obtaining across the various experiments conducted here was the seemingly key role played by union domination of the workplace representative body in elevating strikes.

The policy issues raised by this study are not immediate because our findings are based on a single cross section of data, because the superiority of the works council is not a datum but instead hinges on its type, because good industrial relations may after all trump institutional design, and because strikes are but one outcome indicator and arguably, at their current modest levels, subordinate to other measures of performance. Nevertheless, a prima facie case can be made for encouraging the expression of collective voice through the agency of works councils while seeking to mitigate rent-seeking behavior. The more extensive the powers granted the works council, the greater the attention to be accorded the latter. A complication arises from our finding of the seeming benefits of informal voice. Although we chose not to interpret the latter result as

overturning the potential benefits of works councils free of union domination, one issue raised by informal voice is the pressing need to re-examine the benefits of direct voice.

ENDNOTES

1. The 2013 European Company Survey is also available but the decision was taken not to include it in our analysis given pronounced within-country differences in union and works council incidence across the 2009 and 2013 surveys. The inconsistency was mostly due to discrepancies in the selection of the Employee Representative Questionnaire respondent. Deploying both surveys would thus require some ad hoc procedure to make the incidence of works council and union representation more consistent over time. Further, two of the three alternative strike measures (strike frequency and strike intensity) are unavailable in the 2013 survey. Finally, reflecting confidentiality constraints, the Management and the Employee Representative Questionnaires are provided in separate files in the 2013 ECS. As a result, some matching procedure is required to construct the estimation sample containing variables from the two component surveys. Unfortunately, the large reduction in sample size implied by the matching procedure means that the number of included establishments per country is very small, adversely affecting country representativeness. Limited results for 2013 are nevertheless available from the authors upon request.

2. And might not voice sourced through a union be more an expression of dissatisfaction with the status quo than a communication channel facilitating continuing innovation in labor contracts?

3. Bryson et al. (2010) also advance the interesting argument that the negative association between union membership and satisfaction is confined to uncovered employees who express dissatisfaction with the purpose of achieving coverage.

4. Freeman and Medoff (1984: 179) state that: *"…*unionism per se is neither a plus nor a minus to productivity. What matters is how unions and management interact at the workplace."

5. For a related argument as to why participatory institutions are rare in the United States, see Levine and Tyson (1991) who argue on externality grounds that the market may be systematically biased against participatory workplaces despite their efficiency, and remain stuck in an inferior equilibrium. Participatory workplaces, so the argument runs, rely on narrower wage differentials and just-cause dismissal policies for their traction. These arrangements occasion no difficulty if a participatory firm's policies are also practiced by others. Where this is not the case, the participatory firm will find its best workers quitting and encounter a disproportionate number of shirkers in its applicant pool.

6. Explanations for the *frequent* occurrence of strikes are of course to be found in non-cooperative bargaining theory (where strikes are interpreted as a costly means of communicating the private information of employers) and in political models of strikes (where strikes are viewed as an equilibrating mechanism employed by union leadership as a means of eroding the unrealistically high wage aspiration of the membership).

7. Using industry-sector-level data for seven European countries, 1990–2006, Akkerman finds a strong direct relationship between multiunionism and strike incidence. Her explanation is that divided unions make propagandistic use of strikes to attract members.

8. In a stand-alone analysis of a subjective productivity measure from the 2013 ECS, Braakmann and Brandl (2016) focus on the performance of the collective bargaining *system*, as represented by a 12-element categorization of bargaining type**.**

9. The authors do not attempt link the two parts of their analysis. However, for a study using a subjective measure of firm economic performance from the 2009 ECS that does seek to control for the potential endogeneity of what is termed the 'information and consultation body,' see van den Berg et al. (2013).

10. Analytically, the presence of possible non-response bias is tackled in the final section of this paper. We note here, however, that there seems to be no reason for concern among MM establishments: if an establishment is selected for an MM interview, but not interviewed because of an incorrect address, refusal to answer, etc., the missing establishment is then replaced by a similar establishment. Indeed, four to five establishments are on average required to be contacted in order to have one valid interview. A more debatable issue is non-response in the ER survey. Here, approximately 50 percent of all establishments with a reported (by the MM respondent) employee representation body fail to answer the ER questionnaire. To address this issue descriptively, we divided the sample into two groups (comprising establishments with a valid ER interview and establishments with no interview) and computed the standardized bias across the two groups. The mean standardized bias is approximately 5 percent, suggesting that the covariates are sufficiently balanced (Rosenbaum and Rubin, 1983). Below, we complement this analysis by using a simple behavioral model and again fail to detect any obvious indication of bias.

11. The information is taken from the file 6568english_questionnaires, pp. 86-96, which can be found at the site *https://www.ukdataservice.ac.uk*/.

12. Apart from identifying strikes lasting one or more days the ECS also inquires as to whether the (composite) industrial action was part of a broader campaign at the national, regional, or sectoral level as opposed to being confined to the respondent's own enterprise. Specifically, questions ER263a and ER263b ask this question for single and multiple stoppages, respectively. In each case, as we have seen, the respondent is asked to identify the form of the stoppage. This does not occasion problems in the case of single stoppages but it does for multiple stoppages. First of all, where the respondent claims that stoppages were of both types – that is, both confined to the firm and broader than the firm – it is clearly impossible to distinguish between local and broader stoppages. Second of all, it is now also unclear whether in indicating the level at which industrial action occurred the respondent is referring to a strike event proper or to another identified type of industrial action (namely, a 'refusal to do overtime' or 'other actions'). For both reasons, therefore, we decided not to model 'broad' versus 'confined' strikes.

13. As a practical matter, the jury is still out on the association between high performance work practices and workplace representation (e.g., Gill, 2009; Fairris and Askenazy, 2010).

14. To illustrate, if Y depends on X and treatment W, and if W happens to be positively correlated with X, ideally one would like to give more weight to those individuals/establishments that are less likely to be treated as they are in principle less contaminated by the effect of X. In practice, we use the treatment effects command of Stata for multivalued treatments with the inverse-probability weighting option.

15. The omission of collective bargaining as opposed to union organization in this summary reflects disputation over the precise role of the level of collective bargaining in mediating economic and behavioral/industrial relations outcomes.

16. We also investigated the baseline model for two broader subsamples of countries, namely western European countries in which workplace representation has a long tradition and blocs of western European countries with different state traditions. In the latter case we draw on Blanchard and Philippon (2006) and distinguish between three types of western European country based on the attitude of the nation state towards early unions, as alternatively s*upportive*, *hostile*, and *neutral*, where the latter is the omitted category. The results from the first experiment closely follow the results shown in column (1) of Table 4, with some added precision as to the 'impact' of works councils and union-dominated works councils. For their part, the results from the second exercise support the notion that nations evincing a hostile attitude toward unions are rewarded with significantly higher strike incidence. Again, these results are available from the authors upon request.

17. Note that as all the ER-interviewed units have by definition formal employee representation, the results presented thus far lack any comparative track across groups with and without worker representation.

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Table 1
Types of union and non-union employee workplace representation, 2009 (in percent).

Country	Union representation only (1)	Works council representation only (2)	Both union and works council representation (3)	Formal employee representation (4)	Employee representation present (5)
BE-Belgium	8	14	25	47	65
BG-Bulgaria	10	22	13	45	45
CZ-Czech Rep.	28	3	3	34	35
DK-Denmark	20	8	46	74	76
DE-Germany	0	47	0	47	61
EE-Estonia	2	17	6	25	25
IE-Ireland	17	10	16	43	45
EL-Greece	6	2	5	13	13
ES-Spain	0	63	0	63	68
FR- France	5	21	45	71	74
HR-Croatia	19	6	27	52	52
IT-Italy	2	5	56	63	63
CY-Cyprus	42	0	0	42	41
LV-Latvia	7	15	19	41	44
LT-Lithuania	19	16	4	39	40
LU-Luxembourg	0	59	0	59	60
HU-Hungary	7	11	20	38	39
MT-Malta	19	0	0	19	20
NL-Netherlands	1	55	9	65	68
AT-Austria	0	42	0	42	44
PL-Poland	19	15	19	53	55
PT-Portugal	8	2	3	13	13
RO-Romania	8	42	18	68	68
SI-Slovenia	23	3	29	55	56
SK-Slovakia	23	22	12	57	56
FI-Finland	31	2	41	74	79
SE-Sweden	75	0	0	75	80
UK-United Kingdom	7	16	13	36	33
MK-Macedonia	36	0	0	36	36
TR-Turkey	14	0	0	14	15
All	14	18	16	48	50

Notes: Column (4) is defined as (4) = (1) + (2) + (3). Column (3) flags the cases in which union *and* works council representation coexist at the workplace. Column (5) gives the percentage of all establishments with a workplace employee representation body (formal or informal).
Sources: Authors' computations using the 2009 European Company Survey, unweighted data.

Table 2
Prevalent employee workplace representation categories, 2009 (in percent).

Country	Union representation prevalent	Works council representation prevalent
BE-Belgium	8	39
BG-Bulgaria	22	22
CZ-Czech Rep.	31	3
DK-Denmark	66	8
DE-Germany	0	47
EE-Estonia	8	17
IE-Ireland	33	10
EL-Greece	11	2
ES-Spain	0	63
FR- France	5	66
HR-Croatia	45	6
IT-Italy	28	35
CY-Cyprus	42	0
LV-Latvia	26	15
LT-Lithuania	23	16
LU-Luxembourg	0	59
HU-Hungary	27	11
MT-Malta	19	0
NL-Netherlands	1	63
AT-Austria	0	42
PL-Poland	38	15
PT-Portugal	11	2
RO-Romania	26	42
SI-Slovenia	52	3
SK-Slovakia	35	22
FI-Finland	72	2
SE-Sweden	75	0
UK-United Kingdom	19	17
MK-Macedonia	36	0
TR-Turkey	14	0
All	24	24

Notes: A prevalent works council refers to situations in which there is either a unique works council at the workplace or where the works council agency can be adjudged more influential than the corresponding union agency where both entities are present. Mutatis mutandis for a prevalent union. In practice, if the works council and the union agencies coexist at the workplace and the employee representative respondent is from the works council (union), then the works council (union) prevails.
Sources: Authors' computations using the 2009 European Company Survey, unweighted data.

Table 3
Union dominance in works councils and union agencies, 2009 (in percent).

	Union representation only	Works council representation only	Both union and works-council representation present		All establishments with a formal employee representation
			Assigned as union representation	Assigned as works council representation	
2009					
Union dominated	78	35	76	55	61

Note: See notes to Table 2.

Table 4
The effect of workplace employee representation on strike incidence, marginal effects, 2009.

	Model without interactions (1)	Baseline model (2)	Baseline model with a random slope for the public sector (3)	Baseline model with a random slope for union density (4)
Worker representation/Labor organization:				
Union density	0.0006*** (0.0002)	0.0009*** (0.0003)	0.0008 *** (0.0003)	0.0008* (0.0004)
Works council	-0.069*** (0.020)	-0.060*** (0.020)	-0.054*** (0.019)	-0.052*** (0.019)
Union-dominated works council	0.068*** (0.017)	0.080*** (0.021)	0.071*** (0.020)	0.124*** (0.021)
Union-dominated union agency	-0.010 (0.012)	0.021 (0.020)	0.016 (0.019)	0.042 (0.027)
Union-dominated works council * Union density		0.021 (0.020)	-0.0003 (0.0003)	-0.0006 (0.0004)
Union-dominated union agency * Union density		-0.0006* (0.0003)	-0.0003* (0.0003)	-0.0008* (0.0004)
Collective agreement type:				
Company level	0.016 (0.012)	0.015 (0.012)	0.015 (0.011)	0.007 (0.014)
Higher than company level	0.029** (0.013)	0.029** (0.013)	0.027** (0.012)	0.0197 (0.014)
Mixed level	-0.003 (0.014)	-0.003 (0.014)	-0.002 (0.013)	-0.018 (0.020)
Public sector	0.051*** (0.014)	0.050*** (0.014)	0.047** (0.021)	0.062*** (0.013)
Single establishment	-0.024*** (0.009)	-0.024*** (0.009)	-0.021** (0.008)	-0.028*** (0.009)
N	5,388	5,388	5,388	5,388
Log likelihood	-1,512.7	-1,510.8	-1,497.7	-1,020.3
$\hat{\sigma}^2_{u1}$ (s.e.) [random slope] $\hat{\sigma}^2_{u0}$ (s.e.) [random intercept]	1.901 (0.580)	1.860 (0.570)	0.899 (0.416) 1.777 (0.568)	1.94e-06 (7.25e-07) 0.007 (0.003)
LR test [p-value]	433.3 [0.000]	417.6 [0.000]	443.9 [0.000]	555.9 [0.000]

Notes: Model specification for columns (1) and (2) is based on equation (1) in the text, while equation (2) is used for columns (3) and (4). Works council (union) denotes the presence of a *prevalent* works council (union). See notes to Table 2. The coefficients are estimated using the *melogit* command in Stata 15.0. ***, ** and * denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 5
The effect of workplace employee representation on strike incidence in selected subsamples, marginal effects, 2009.

	Replicating Table 4, column (1)	Case 1 S1 and S2 countries	Case 2 S3 and S4 countries	Case 3 S3 countries	Case 4 S4 countries	Case 5 S1 and S4 countries	Case 6 S1 and S3 countries
Type of workplace representation and labor organization:							
Union density	0.0006*** (0.0002)	0.0005* (0.0003)	0.0006** (0.0002)	0.0006* (0.0004)	0.0006 (0.0003)	0.0006** (0.0003)	0.0006** (0.0003)
Works council	-0.069*** (0.020)	-0.097** (0.045)	-0.0734 *** (0.027)	-0.095** (0.043)	-0.066 (0.043)	-0.087** (0.036)	-0.073 (0.033)
Union-dominated works council	0.068*** (0.017)	0.059** (0.024)	0.067*** (0.023)	0.070** (0.030)	0.011 (0.063)	0.083*** (0.029)	0.061** (0.024)
Union-dominated union agency	-0.010 (0.012)	-0.093** (0.041)	-0.009 (0.015)	-0.015 (0.034)	-0.008 (0.017)	-0.009 (0.014)	-0.010 (0.024)
N	5,388	1,368	3,529	1,183	2,346	3,217	2,054
LR test [p-value]	433.3 [0.000]	47.20 [0.000]	284.76 [0.000]	56.28 [0.000]	186.64 [0.000]	247.87 [0.000]	164.79 [0.000]

Notes: Cases 1 to 6 are implemented using the model specified in Table 4, column (1). S1(S2) is defined as the set of countries with a works council-type representation only (with a union-type representation only); and S3 (S4) contains countries with dual systems but in which works council-type representation is found in more than 70% of the cases (in which union-type representation is found in more than 70% of the cases). Given the definitions, Bulgaria and United Kingdom are not included in any of the four sets.

Table 6.
The effect of workplace employee representation on strike incidence, with control for dissonance as to the perceived quality of industrial relations at the establishment, selected subsamples, marginal effects, 2009.

	Dissonance-augmented Baseline model (1)	Baseline model with organizational changes (2)	With the addition of establishments having informal workplace representation (3)
Worker representation/Labor organization:			
Union density	0.0009*** (0.0003)	0.001*** (0.0003)	0.0008*** (0.0002)
Works council	-0.052*** (0.019)	-0.052*** (0.020)	-0.018 (0.013)
No formal workplace representation			-0.078** (0.039)
Union-dominated works council	0.084*** (0.022)	0.084*** (0.022)	
Union-dominated union agency	0.025 (0.020)	0.026 (0.021)	
Union-dominated works council * Union density	-0.0005* (0.0003)	-0.0006* (0.0003)	
Union-dominated union agency * Union density	-0.0006* (0.0003)	-0.0007 ** (0.0003)	
Collective agreement type:			
Company level	0.017 (0.012)	0.018 (0.012)	0.020* (0.011)
Higher than company level	0.029** (0.013)	0.030** (0.013)	0.035*** (0.013)
Mixed level	0.0002 (0.014)	0.002 (0.015)	0.005 (0.014)
Public sector	0.054*** (0.015)	0.051*** (0.014)	0.053*** (0.014)
Single establishment	-0.022** (0.009)	-0.022** (0.009)	-0.027*** (0.009)
Dissonance:			
Dissonance_1	0.046*** (0.012)	0.048*** (0.013)	0.043*** (0.012)
Dissonance_2	0.023** (0.010)	0.022** (0.010)	0.022** (0.009)
Organizational changes:			
Changes in the remuneration system		0.020** (0.009)	
Changes in the work process		-0.005 (0.008)	
Changes in the working time		-0.014 (0.009)	
Restructuring measures		0.001 (0.008)	
N	5,080	4,984	5,297
Log likelihood	-1,378.2	-1,353.7	-1,378.2
$\hat{\sigma}_u^2$ (s.e.)	1.813 (0.561)	1.837(0.569)	1.813 (0.561)
LR test [p-value]	365.7 [0.000]	352.3 [0.000]	365.7 [0.000]

Note: See notes to Table 4.

Table 7
The effect of workplace employee representation on strike incidence, instrumental variable estimates, selected marginal effects, 2009.

	Dissonance-augmented Baseline model (Table 6, first column) (1)	Dissonance-augmented Baseline model using CMP (2)	Instrumental variable estimates using CMP (3)
Worker representation/Labor organization:			
Union density	0.0009*** (0.0003)	0.0005** (0.0002)	0.0003 (0.0002)
Works council	-0.052*** (0.019)	-0.043* (0.025)	-0.106*** (0.027)
Union-dominated works council	0.084*** (0.022)	0.084*** (0.017)	0.112*** (0.018)
Union-dominated union agency	0.025 (0.020)	-0.007 (0.025)	-0.040* (0.021)
Dissonance_1	0.046*** (0.012)	0.058*** (0.017)	0.057*** (0.015)
Dissonance_2	0.023** (0.010)	0.029** (0.014)	0.027 ** (0.013)
$\hat{\sigma}_u^2$ (s.e.)	1.813 (0.561)	0.724 (0.076)	0.718 (0.072)
N	5,080	5,080	5,087
Log likelihood	-1,378.2	-1,448.0	-2,366.4
Cross-equation correlation in the instrumental variable approach			0.373 (0.081)

Notes: The selected instrument in column (3) is given by a dummy variable defined as equal to 1 if there is in the establishment any performance related elements of pay for staff other than the top management, 0 otherwise. In all columns of the table, the implementation includes country random intercepts as specified in model (1) in the text. Works council status is assumed exogenous in columns (1) and (2) and endogenous in (3). The instrument is statistically significant in the works council first-stage equation (at the .05 level), while the exclusion restriction is satisfied as the evidence suggests that the instrument only impacts strike incidence through its effect on the choice of works council/union. ***, ** and * denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 8
Average treatment effects with multiple treatments and inverse probability weights, 2009.

Treatment and control groups:	Average Treatment Effect
Union-dominated union versus nonunion-dominated union representation	-0.010 (0.017)
Nonunion-dominated works council versus nonunion-dominated union representation	0.020 (0.027)
Union-dominated works council versus nonunion-dominated union representation	0.080*** (0.022)
Union-dominated works council versus nonunion-dominated works council	0.059** (0.028)
N	5,073

Notes: The multivalued or multiple treatment is defined as 0, 1, 2, or 3 if the establishment has, respectively, a nonunion-dominated union representation, a union-dominated union, a nonunion-dominated works council, or a union-dominated works council. The average treatment effect is obtained using the *teffects aipw* (i.e. the augmented inverse-probability weighting) command in Stata. The set of observables is the same as in Table 6, column (1). ***, ** and * denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 9
Predicted probabilities of strike duration, strike frequency, and strike intensity by composite workplace employee representation type, 2009.

Workplace employee representation type	Case 1 Strike duration (Dependent variable: *strike_dur*) [1 for 'No strikes'; 2 for 'less than one day'; 3 for 'one day or more']			Case 2 Strike frequency (Dependent variable: *strike_N*) [1 for 'No strikes'; 2 for 'one strike'; 3 for 'more than one strike']		
	Pr1	Pr2	Pr3	Pr1	Pr2	Pr3
Union-dominated works council	0.780	0.090	0.130	0.800	0.121	0.079
Nonunion-dominated works council	0.933	0.033	0.034	0.943	0.039	0.018

	Case 3 Strike intensity											
	(Dependent variable: *strike_ord*) [1 for 'No strikes'; 2 for 'one strike for less than a day'; 3 for 'all else'] (1)			(Dependent variable: *strike_ord*) [1 for 'No strikes'; 2 for 'one strike for less than a day'; 3 for 'one strike for one day or more'] (2)			(Dependent variable: *strike_ord*) [1 for 'No strikes'; 2 for 'one strike for less than a day'; 3 for 'more than one strike for less than one day'] (3)			(Dependent variable: strike_ord) [1 for 'No strikes'; 2 for 'one strike for less than a day'; 3 for 'more than one strike for one day or more'] (4)		
	Pr1	Pr2	Pr3	Pr1	Pr2	Pr3	Pr1	Pr2	Pr3	Pr1	Pr2	Pr3
Union-dominated works council	0.858	0.051	0.091	0.900	0.047	0.053	0.909	0.069	0.022	0.911	0.069	0.020
Nonunion-dominated works council	0.956	0.018	0.026	0.965	0.017	0.018	0.976	0.019	0.005	0.977	0.018	0.005

Notes: The predicted probabilities are obtained using the postestimation command *meologit* in Stata 15.0. For strike duration in Case 1, for example, Pr1, Pr2, and Pr3 give the probability of an establishment having no strikes, at least one strike of less than a day, and at least one strike of a day or more, respectively, conditional on the set of included variables. Accordingly, the first cell entry on the top left (i.e. 0.780) gives the mean probability of an establishment with a union-dominated works council experiencing no strikes over a period of one year. The set of included regressors is the same as in Table 6, column (1). Full description of the variables *strike_dur*, *strike_N* and *strike_ord* are given in the Appendix.

Table 10
An analysis of non-response bias using firm performance as the dependent variable, 2009.

	All establishments with formal employee representation
Sector:	
Construction	0.384***
Wholesale, retail, and vehicles	0.256***
Hotels and restaurants	0.244*
Transport and communication	0.248**
Financial intermediation	1.261***
Real estate	0.504***
Public administration	0.039
Education	0.089
Health	0.081
Other	0.291***
Establishment size:	
20-49	0.135*
50-99	0.106
100-149	0.317***
150-199	0.123
200-249	0.283**
250-299	-0.002
300-399	0.320***
400-499	-0.027
500+	0.143*
Collective agreement type:	
Company level	0.138**
Higher than company level	0.084
Mixed	0.130
Works council	0.179***
IR quality/Management view only	1.432***
Public sector	-0.146
Single establishment	0.0654*
ERint	-0.016
N	11,886
Log likelihood	-7,488.2
$\hat{\sigma}_u^2$ (s.e.)	0.243 (0.069)
LR test [p-value]	354.68 [0.000]

Notes: The reported coefficients are obtained by using a two-level mixed-effects logistic model similar to model (1) in the text. The sample is given by all the establishments with a formal employee representation body. The dummy *ERint* flags the situation where an employee representative has actually been interviewed. The dependent variable Y_{ij} is given by the performance dummy variable *economic/financial situation*, defined as 1 if the economic/financial situation of the establishment is adjudged very good or good, 0 otherwise. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively. In the interests of economy, standard errors have been omitted from the table.

Figure 1
Country random intercepts by increasing order.

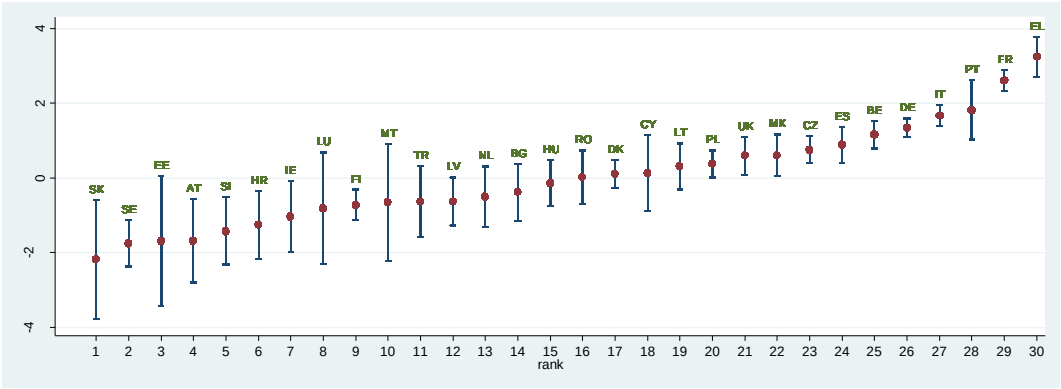

Figure 2
Country random slopes for the public sector variable case.

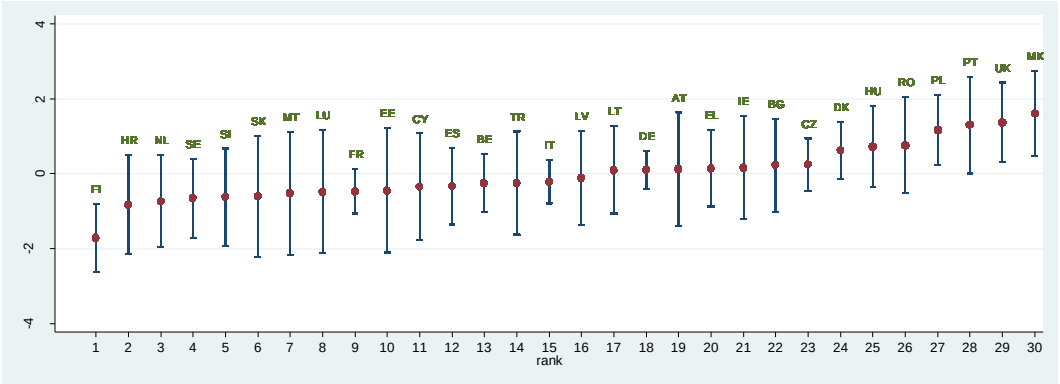

Figure 3
Country random slopes for the union density variable case.

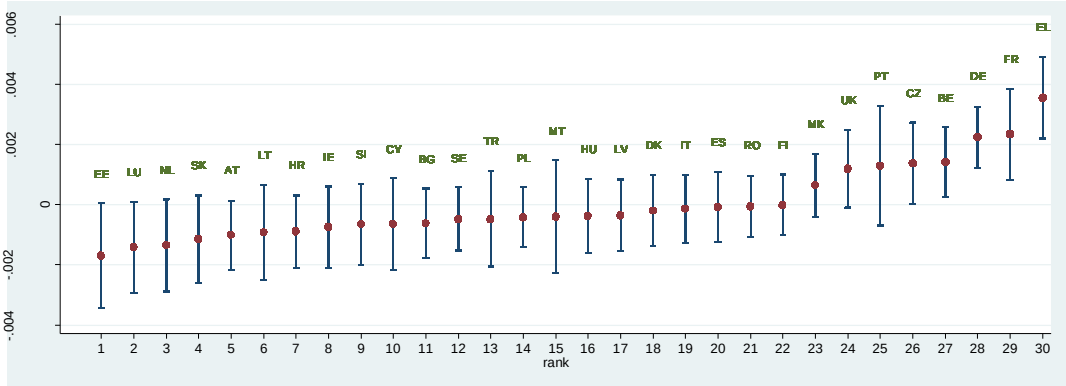

TABLE A.1
Mapping workplace formal employee representation to establishments and countries, 2009.

Country	Trade union representation	Works council type of representation
BE Belgium	Délégation syndicale	Comité d'entreprise (MM650_2) Comité de negociation particulier ou de base (MM650_3)
BG Bulgaria	Синдикална организация	Представители за информиране и консултиране на работниците (MM650_2)
CZ Czech Rep.	Odborová organizasse	Rada zaměstnanců (MM650_2)
DK Denmark	Tillidsrepræsentant	Samarbejdsudvalg (MM650_2) MED-udvalg (MM650_3)
DE Germany	No trade union representation	Betriebsrat (MM650_2) Personalrat (MM650_3)
EE Estonia	Ametiühing	Töötajate usaldusisik (MM650_2) Euroopa Töönõukogu (MM650_3)
IE Ireland	Workplace trade union representative	Statutory employee representative forum (MM650_2)
EL Greece	Επιχειρησιακό σωματείο	Συμβούλιο εργαζομένων (MM650_2)
ES Spain	No trade union representation in 2009 Sección syndical in 2013	Comité de empresa (MM650_2) Junta de personal (MM650_3
FR France	Délégué syndical	Comité d'entreprise (MM650_2)
IT Italy	Organizzazione sindacale in 2009; Rappresentanza sindicale aziendale in 2013	Rappresentanza sindacale unitaria (RSU) (MM650_2) Rappresentanza sindacale aziendale (RSA) (MM650_3)
CY Cyprus	Συνδικαλιστική Εκπροσώπηση	No works council-type representation
LV Latvia	arodbiedrība	Darbinieku pilnvarotie pārstāvji (MM650_2) Darba padome (MM650_3)
LT Lithuania	Profesinė sąjunga	Darbo taryba (MM650_2)
LU Luxembourg	No trade union representation	Comité mixte de entreprise (MM650_2) Délégation du personnel (MM650_3)
HU Hungary	Szakszervezet (bizalmi)	Üzemi tanács (MM650_2) Üzemi megbízott (MM650_2)
MT Malta	Shop steward (recognized union representative)	No works council-type representation
NL Netherlands	Bedrijfsledengroep in 2009 No trade union representation in 2013	Ondernemingsraad (MM650_2)
AT Austria	No trade union representation	Betriebsrat (MM650_2) Personalvertretung (MM650_3)
PL Poland	Zakladowa organizacja zwiazkowa	Rady pracowników (MM650_2) Przedstawiciele załóg w radach nadzorczych (MM650_3)
PT Portugal	Comissão sindical or Comissão intersindical	Comissão de trabalhadores (MM650_2)
RO Romania	Sindicat	Reprezentanţii salariaţilor (MM650_2)
SI Slovenia	Sindikalni zaupnik	Svet delavcev (MM650_2)
SK Slovakia	Základná organizácia odborového zväzu in 2009; Odborová organizácia in 2013	Zamestnaneckárada (MM650_2)
FI Finland	Ammattiosasto	YT-toimikunta (MM650_2)
SE Sweden	Facklig förtroendeman	No works council representation
UK United Kingdom	Recognised shopfloor trade union representation	Joint consultative committee, employee forum or equivalent body (MM650_2)

HR Croatia	Sindikat	Radnicko vijece (MM650_2) Predstavnik (MM650_3)
MK Macedonia	Recognised shop floor trade union organization in 2009; Синдикат/Sindikatë in 2013	No works council-type representation
TR Turkey	Sendika İşyeri Temsilciliği in 2009; Ticaret Birlikleri in 2013	No works council-type representation

Notes: The mapping is based on the available raw MM variables. Supplementary information was taken from the 2009 ECS technical reports. The dataset includes 7 raw employee representation groups. Typically, group 1 flags a formal union representation, while groups 2 and 3 identify formal works council-type agencies. In general, groups 4-7 comprise informal union and non-union worker representation. In practice, in 2009 union workplace representation is exclusively based on the raw dummy variables MM650_1. The basis for the construction of the works council dummy is given by the raw variables MM650_2. In some countries these variables were supplemented by the information based on variables MM650_3-MM650_7. To reduce the margin of error, in all cases in which we were not sure whether the works council-type agency was a formal employee representation body, we exclusively used the variable MM650_B as the basis for the trade union and works council-type representation. The variables MM650_1 and MM650_2 are documented in the files *6568english_questionnaires* (pp. 86-96), available at the U.K. Data Service site.
Source: The 2009 European Company Survey and corresponding technical reports.

TABLE A.2
Variable definition and estimation sample means of selected variables (in percent), 2009.

Variable	Mean	Definition
Strike incidence	12	1/0 dummy: 1 if there has been a stoppage or strike in the establishment in the last 12 months
Workplace representation:		
Union only	35	1/0 dummy: 1 if the union is the single formal ER body present at the workplace
Works council only	31	1/0 dummy: 1 if the works council is the single formal ER body present at the workplace
Both a union and a works council	34	1/0 dummy: 1 if both the union and the works council are present at the workplace
Prevalent union	60	1/0 dummy: 1 if there is either a unique union agency at the workplace or where the union agency can be adjudged more influential than the corresponding works council agency where both entities are present.
Prevalent works council	40	1/0 dummy; 1 if there is either a unique works council agency at the workplace or where the works council agency can be adjudged more influential than the corresponding union agency where both entities are present.
Union organization:		
ER union density	65	Union density of the employee representation body.
Establishment union density	53	Union density at the establishment
Union-dominated union club	47	1/0 dummy: 1 if a union or a prevalent union representation is present and the majority of representatives are trade union members
Union-dominated works council	16	1/0 dummy: 1 if a works council or a prevalent works council is present and the majority of representatives are trade union members
Collective agreement:		
No collective agreement	14	Individual agreement (i.e. no collective agreement)
Company level	34	Company level agreement
Higher than company level	45	Higher than company level agreement
Mixed level	7	Mixed-level agreement (i.e. company level and higher than company level).
IR quality:		
General work climate: Workers' representative view	85	(IR_quality_ER)1/0 dummy: 1 if the relationship between management and employee representation can best be described as hostile (disagree or strongly disagree)
General work climate: Management view	80	(IR_quality_MM)1/0 dummy: 1 if the general work climate in the establishment is very good or good
Dissonance:		
Deviation/Dissonance_1	13	1/0 dummy: 1 if IR_quality_MM = 1 and IR_quality_ER = 0
Deviation/Dissonance_2	19	1/0 dummy: 1 if IR_quality_MM = 0 and IR_quality_ER = 1
Deviation (reference category)	68	1/0 dummy: 1 if IR_quality_MM = 1 and IR_quality_ER = 1
Changes in organization:		
Changes in the remuneration system	30	1/0 dummy: 1 if major changes in the remuneration system were introduced in the past three years.
Changes in the work process	45	1/0 dummy: 1 if changes in the organization of the work process were introduced in the past three years.

Changes in the working time	26	1/0 dummy: 1 if changes in the working time arrangements were introduced in the past three years
Restructuring measures	36	1/0 dummy: 1 if restructuring measures were introduced in the past three years.
Single establishment	64	1/0 dummy: 1 if single independent company or organization
Public sector	39	1/0 dummy: 1 if establishment belongs to the public sector
Industry affiliation:		
Industry	33	Code CDE (Manufacturing and energy)
Construction	6	Code F (Construction)
Commerce and hospitality	11	Commerce and hospitality [code G (Wholesale and retail trade; repair of motor vehicles, motorcycles, and personal and household goods); and code H (Hotels and restaurants)]
Transport and communication	4	Transport and communication [code I (Transport, storage and communication)]
Financial services and real estate	2	Financial services and real estate [code J (Financial intermediation); and code K (Real estate, renting and business activities)]
Other services	44	Other services [code L (Public administration and defense; compulsory social security), M (Education), N (Health and social work); and code O (Other community, social and personal service activities)]
Establishment size:		
10 to 49 employees	32	
50 to 249 employees	37	
More than 250 employees	31	
Number of observations	5,080	

Notes: The means are obtained for a sample of establishments in which all the selected ER and MM variables are present (i.e. non-missing). Using the specification in column (1) of Table 6, this yields a total of 5,080 establishments.

Appendix. Construction of the additional strike indicators

The three alternative strike indicators are based on the new variables *strike_ord*, *strike_N*, and *strike_dur*. Each is presented in turn.

The derivation of strike intensity (*strike_ord*)

Note first that if the respondent reports just one instance of industrial action, then the *one strike or stoppage for less than one day* case can be distinguished from the *one strike for one day or more* case. This yields the new categorical variable *strike_ord*, defined as equal to 1 if (_a, _1); 2 if (_a, _2); and 0 if no strike at all is reported (i.e. if *strike = 0*). If, however, there is more than one instance of industrial action, then additional data manipulation is required as the count cannot be based on _3 or _4 events (i.e. non-strike/stoppage events). Again using the structure of the dataset, it is possible to uniquely distinguish the case of 'more than one strike for less than one day' from the 'more than one strike for one day or more' in situations where they are mutually exclusive events. These cases correspond to (_b, _1) and (_b, _2), respectively, so that *strike_ord = 3* if (_b, _1) and *strike_ord = 4* if (_b, _2), conditional on both 'refusal to work overtime' and 'other actions' not being observed at all.

Given the procedures required to correctly code all required mutually exclusive events flagged by the categorical variable *strike_ord* in the 0 through 4 scale, some observations are lost in comparison with the *strike* variable. This is the cost of going beyond a simple measure of strike incidence. Indeed, from a total of 768 cases in which the *strike* variable is equal to 1, *strikes_ord* produces a total of 494 observations, with 181 coded as 1, 195 as 2, 61 as 3, and 57 as 4. The raw number of observations in which there is no stoppage/strike is of course unchanged.

Once *strike_ord* is coded, the second step amounts to generating some relevant ordering. Clearly, the ordering $0 < 1 < 2 < 3 < 4$ is not valid as, for example, one strike for one month (coded as *strike_ord = 2*) would appear to dominate, say, three strikes of less than one day (coded as *strike_ord = 3*); while, similarly, two strikes of two days (coded as *strike_ord = 4*) are apparently dominated by, say, one strike of one week (coded as *strike_ord = 2*). In other words, any of the ordering $2 < 3$, $2 < 4$ can be reversed, and $3 < 4$ can be reversed as well.

Given the construction of *strike_ord*, it is nevertheless the case that the ordering $0 < 1 <$ all the rest (the rest being given by the amalgamation of categories 2, 3, and 4) can be implemented. Furthermore, the following orderings are also valid: $0 < 1 < 2$ (categories 3 and 4 are dropped); $0 < 1 < 3$ (categories 2 and 4 are dropped); and $0 < 1 < 4$ (categories 2 and 3 are dropped). These

orderings allow us to define our first indicator, the strike intensity measure, that is, Case 3 in Table 6, with columns (1) through (4) denoting the four respective possibilities.

***The derivation of strike frequency* (*strike_N*)**

Our second indicator flags the number of strike episodes. This is Case 2 in Table 9.In this case, we generate the variable, *strike_N*, defined as equal to 0 if no strikes (or *strike = 0*); 1 if there is one strike (amalgamating strikes of less than one day and strikes lasting one day or more); and 2 if there is more than one strike (again amalgamating the two possibilities). In this scenario, we have $0 < 1 < 2$, and we end up with 631 'non-zero' observations, a larger number than in the previous *strike_ord* case as some of the cases in which (_b, _1) and (_b, _2) are both observed do not have to be dropped in this configuration.

The derivation of strike duration (strike_dur)

This is Case 1 in Table 9. The third alternative is to flag strikes of less than one day's duration versus those strikes lasting one day or more, to obtain the variable *strike_dur*, set equal to *0* if *strike = 0*; *1* if strikes are of less than one day; and 2 if strikes are of one day or more. Again, we have $0 < 1 < 2$, with no need to discard any of the raw 768 observations.