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Abstract
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Keywords
worker participation, works council, productivity

Cover Page Footnote
I have benefited from comments by Colin Cameron, Bernd Fitzenberger, Tom Mroz, Claus Schnabel, Ann Huff Stevens, participants of the 15th International Conference on Panel Data, participants of the 2009 SOLE and EALE meetings, the editor, and three anonymous referees. I thank Regina T. Riphahn for important comments and continuous encouragement.

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WORKS COUNCILS AND ESTABLISHMENT PRODUCTIVITY

STEFFEN MUELLER*

Declining union density in many industrialized countries increases interest in alternative forms of employee representation, such as works councils. The German works council is one of the most powerful forms of worker representation in developed countries, but little is known of its causal effect on productivity. The author used a large linked employer-employee panel data set to examine this issue. Comparing firms with and without a works council, the author finds that establishments with a works council are on average 6.4% more productive; but he also presents evidence that this figure underestimates the true productivity effect of works councils.

The present system of labor relations in the United States is part of the New Deal initiated between 1933 and 1936 by President Franklin D. Roosevelt in reaction to the Great Depression. While strengthening workers' rights when engaging in collective bargaining, the National Labor Relations Act of 1935 makes it unlawful for an employer to "dominate or interfere with the formation or administration of any labor organization or contribute financial or other support to it."[1] As a result, managers have limited opportunity to support alternative forms of worker representation, and the present system of industrial relations contains union bargaining but no mandatory, institutionalized, or otherwise widespread form of workplace representation other than union representation.

The share of union members among private sector workers decreased from 24.2% in 1973 to 7.2% in 2009 (Hirsch and Macpherson 2010); and low union density raises doubts about whether this system still does a good job and increases interest in alternative forms of employee representation at the workplace. In the mid-nineties, academic economists and sociologists,[2]

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[1]Section 8(a)(2) of the National Labor Relations Act.

[2]For example, Rogers and Streeck (1995) published an influential book on works councils, and Richard B. Freeman (1994) edited the NBER research volume *Working under Different Rules*, which took a broader view on the labor relation systems outside the United States.

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but also others[3] analyzed the industrial relations system of European countries to learn, among other things, which institutions might help to improve the competitive position of the United States. Possibly because of uncertainty about the economic consequences of formalized participation, this wave of interest passed without strengthening employees' participation rights in the National Labor Relations Act.

The most prominent example of nonunion workers' participation in European countries is employee representation via works councils. Rogers and Streeck define works councils as "institutionalized bodies for representative communication between a single employer and the employees of a single plant or enterprise" (1995: 6). Works councils are designed to give workers a collective voice and to increase workplace democracy. But they do more: many studies show that they contribute positively to a society's regulatory performance by enforcing commitment to legal standards regarding factors such as environmental protection (Askildsen, Jirjahn, and Smith 2006), gender equality (Heywood and Jirjahn 2009), and health and safety (Weil 1999). The hypothesis of increased establishment productivity through works councils rests mainly on the assumption that they improve communication between management and workers. Works councils can be an important source of information for managers and can help them improve the quality of their decisions. Councils may also be able to motivate both parties to make longer term commitments (Freeman and Lazear 1995) and hence increase the probability of workers' concessions in economically difficult times and of higher investments in firm-specific human capital. Smith (1991) argues that employee participation may reduce opportunistic behavior by managers. Nevertheless, a works council may also worsen performance. Depending on the specific design of the council's rights, managers may have to consult it or have to come to an agreement with it in situations where fast decision-making is necessary. If councils have codetermination rights, they can block decisions. Therefore, from a theoretical point of view, the productivity effect of works councils is unclear.

German works councils are among the most powerful in Europe (see Streeck 1995 or Thelen and Turner 1997 for a comparative review of European works councils) and are therefore an interesting subject for investigation. Although studies on the distributional effects of works councils (e.g., Addison, Teixeira, and Zwick 2010; Mueller 2011b) are clearly of interest, the central criterion for the economic evaluation of the efficiency of works councils is their effect on productivity. Most studies found a positive relationship between council existence and establishment productivity in Germany. To date there has been no controlled experiment to assess the causal productivity effect of works councils, but in this study I aim to come closer to estimating that effect by addressing the data limitations and methodological problems of earlier papers.

[3]See, e.g., the final report of the Commission on the Future of Worker-Management Relations ("Dunlop Commission") initiated by the U.S. Department of Labor (U.S. Department of Labor 1994).

German Works Councils

In Germany, the Works Constitution Act (*Betriebsverfassungsgesetz*) is the legal base for works councils. The law was enacted in 1952, and a major reform took place in 1972. Although the 1952 Works Constitution Act (WCA) can be seen as a reaction to the business elite cooperation with the Nazi regime and as a step forward to a democratized capitalism, as Mueller-Jentsch (1995) argues, the employers too had an incentive to establish a strong employee institution as a counterbalance to the powerful unified trade union movement of the time.[4]

The Works Constitution Act (WCA) gives workers the right to set up a council in establishments with at least five employees. Hence, works councils are mandatory but do not evolve automatically. The employer bears the expense for the election and other costs incurred by the council. Works council members are elected for a period of four years and enjoy extended employment protection. In establishments with more than 200 employees, at least one employee acts as a full-time works council representative. The larger the establishment, the higher the number of works council representatives and the greater their rights.

In general, works council rights are weaker with regard to financial and economic affairs and stronger in personnel matters and social concerns. Explicitly, the WCA gives councils codetermination rights in the field of workers' health and safety and of social and personnel matters such as the introduction of new salary payment methods, the regulation of overtime, recruitment guidelines, transfers, and dismissals. Furthermore, the councils have the right to information and consultation in financial matters, personnel planning, changes in the work environment, and the adoption of new technologies.

The WCA not only determines the rights of councils, it also obliges councilors to cooperate with management. Councils and management should act in "a spirit of mutual trust," "in cooperation with union and employer organizations," and "to the benefit of the employees and of the establishment" (WCA: Section 2). The law also stipulates that councils have no wage bargaining power and no right to call a strike nor is the work of the union restricted by the WCA. Hence, the German system of industrial relations consists of two parts. While unions have the exclusive right of industrywide collective bargaining, works councils are designed to be the collective voice on workplace conditions for *all* workers in a specific plant or establishment, regardless of whether they are union members or not or whether their establishment is covered by collective bargaining. Although works councils and unions are formally independent, most works councilors are union members or have close ties to a union. Unions devote expertise and financial resources to councils, and works councilors often actively recruit new union members (Behrens 2009).

[4]Addison (2009) gives an excellent history of German works councils.

Literature

How Can Works Councils Affect Productivity?

The managerial competence model of FitzRoy and Kraft (1985) postulates that the most competent managers are able to install effective communication without the need for a works council. In their approach, works councils are generally seen as a constraint on managerial freedom, and it is argued that this constraint comes at the price of decreased productivity. FitzRoy and Kraft acknowledge the possibility of positive effects on productivity in badly managed firms but draw, nevertheless, rather pessimistic conclusions about the productivity effect of works councils.

One weakness of their approach is the central assumption of competent managers being able to make workplace representation obsolete. Freeman and Lazear (1995) point to situations where worker representation is necessary to build up trust on the employee side. Councils act as the collective voice (Freeman 1976), and as the ear of the workers, and they are therefore able to reduce information asymmetries between labor and management.[5] In the absence of works councils, management may misinform workers about the true economic state of the firm in order to extract higher effort. Anticipating such strategies, workers may distrust management information, even if it is truthful. Councils with the legal right to information are able to act as the workers' ears by verifying such information, and thus they may be able to solve or at least reduce the communication problem. More generally, the trust mechanism may be important in the presence of incomplete or implicit labor market contracts: the collective voice approach predicts that worker representation can foster workers' trust in implicit contracts by preventing employers from engaging in opportunistic behavior, and therefore collective voice eases efficient long-term contracting. In that sense, worker representation may add to establishment performance even in the presence of perfect managers.[6]

As their collective voice, councils also communicate workers' preferences to the management. The right to consultation commits the employer to listening to this voice and to consulting the council before making changes. In addition, formal consultation provides a forum for both sides to find new solutions to problems and this may help managers to improve the quality of their decisions. If a council has the right of codetermination on a particular matter, its agreement is necessary for any decision.

Giving workers a voice and letting them articulate dissatisfaction will reduce costly quits (Hirschman 1970). Several studies found a decrease in personnel turnover in cases of works council presence (see, e.g., Frick 1996; Addison, Schnabel, and Wagner 2001) supporting a reduced exit propensity.

[5]The collective voice paradigm was originally developed to explain union behavior, but some of its aspects can be generalized to works councils.

[6]See Addison (2009) for a recent and comprehensive discussion of the theory of codetermination.

Section 80 of the WCA calls upon councils to enforce the legal rights of workers at establishment level. The strong employment protection legislation,[7] codetermination rights, and the council's support to workers (e.g., legal advice) have the potential to hinder layoffs considerably.[8] As a result, workers and management may make longer-term commitments, which would increase the willingness of both sides to invest in firm-specific human capital.

Of course, all these positive effects can be costly. If councilors do not work in a "spirit of mutual trust" and "to the benefit of the establishment," as demanded by the WCA, they can reduce the performance of the company. Even if councils are cooperative, however, some of their characteristics inherently lead to decreased productivity. Informing a works council takes time and in turn, the consultation phase takes more time. This time lapse *before* a decision can be made often results in the loss of a profitable opportunity. Codetermination can lead to suboptimal allocation of an establishment's resources and, of course, having employment security may create an incentive for moral hazard. In short, whether the benefits of councils outweigh the cost is an empirical question.

Empirical Results of Earlier Studies

Early empirical studies on works councils originated in the 1980s and early 1990s and, starting with the work of FitzRoy and Kraft (1985), arrived at a rather pessimistic conclusion regarding the productivity effect of works councils. Unfortunately, the early studies suffer from very small sample sizes and from being restricted to certain industries or regions.[9]

Since the early work, primarily two large-scale data sets have been used to date, the IAB Establishment Panel[10] (e.g., Frick and Moeller 2003; Schank, Schnabel, and Wagner 2004; Addison, Schank, Schnabel, and Wagner 2006; Wolf and Zwick 2008) and the Hannover Panel[11] (e.g., Addison et al. 2001; Huebler and Jirjahn 2003; Jirjahn 2003). Generally, the estimated productivity effect of councils is nil or positive, ranging from insignificant effects close to zero (Schank et al. 2004; Addison et al. 2006) to large effects (i.e., around 15% in Addison et al. 2001 and Wolf and Zwick 2008, and up to 30% in Frick and Moeller 2003 and Addison et al. 2006).[12] All studies with large

[7]According to the overall employment protection index of the OECD (2004: chart 2.1), 18 out of 28 countries have less strict regulations than Germany.

[8]A methodological implication of increased employment protection through works councils is that workers could tend to set up a works council in times of bad establishment performance to save their jobs. This kind of self-selection will lead to a downward bias in the estimated effect of a works council on the productivity of an establishment.

[9]See Addison, Schnabel, and Wagner (2004) for an overview and a discussion of the results from the early studies.

[10]See http://www.iab.de/de/erhebungen/iab-betriebspanel.aspx.

[11]Observations from the 1994–97 period, meanwhile part of the IAB Establishment Panel.

[12]The negative sign of the productivity effects in the early studies can also be explained by improvements in the functioning of the works council apparatus over time. Qualitative evidence by Kotthoff

productivity estimates applied OLS (Ordinary Least Squares), while those that arrived at a zero effect, used the fixed effects estimator.[13] The difference can be explained by unobserved heterogeneity that leads to upward-biased OLS estimates. This does not mean, however, that the insignificant estimates close to zero are necessarily correct. A fixed effects estimator only uses within-establishment variation to identify partial effects. Hence, the insignificance could be explained by the fact that few establishments set up a new council or close down an existing one (see, e.g., Addison et al. 2006).

Most existing studies on council productivity effects do not aim to provide causal inference. This may be explained in part by the availability of only rather crude capital stock information in the data sets used,[14] which makes it impossible to address the simultaneity of output and input decisions. Further, some studies do not take into account self-selection of firms into the works council regime, or they ignore problems with the sample selection. Addressing these shortcomings, my study aims to come as close as possible to the lower boundary of the true effect of works councils on productivity.

Data

This analysis is based on the Linked Employer-Employee Panel of the Institute for Employment Research (IAB). In the data set, administrative information on employees is matched with survey information on establishments. The survey unit is the establishment or local production unit, rather than the legal and commercial entity of the company.

Selection of Sample

I restricted the analysis to the manufacturing sector. Since works council rights increase substantially if an establishment has more than 20 employees, I excluded all establishments that have fewer than 21 employees in at least one of the periods under consideration. The probability of works council existence increases with establishment size: while only about half of the establishments with 21 to 100 employees have a council, this increases to 99% in the group of manufacturing establishments with more than 300 employees. One criticism of earlier studies that neglect the correlation between establishment size and the existence of a works council is that the productivity effect measured may be biased due to unobserved effects related to establishment size. To avoid this problem, my analysis is confined to

(1994) suggests that it took a long time until works councils were accepted by both unions and managers. Comparing interviews conducted in 1990 with interviews from 1975, he finds that an initially highly ideological confrontation between managers and works councilors has given way to a more businesslike and professional attitude on both sides. He also finds that unions' acceptance of councils is substantially higher in 1990 compared to his 1975 study.

[13]Addison et al. (2006) applied both estimators within the same paper.

[14]See Mueller (2008) for a discussion of capital stock approximation.

Table 1. Summary Statistics

	Works Council		*No Works Council*	
Variable	*Mean*	*Standard deviation*	*Mean*	*Standard deviation*
Average residual from first-step GMM-SYS estimation	0.08	0.45	–0.11	0.43
Churning rate (%)	2.66	2.60	4.23	6.94
Covered by collective bargaining (yes = 1)	0.71	0.40	0.29	0.38
East Germany (yes = 1)	0.37	0.48	0.55	0.50
State of technology (index: 1 = state of the art; 5 = obsolescent)	2.26	0.65	2.12	0.58
21–100 workers (yes = 1)	0.44	0.47	0.82	0.37
Part-time workers (%)	5.84	7.50	9.35	11.32
Temporary workers (%)	3.83	8.49	2.15	4.59
Apprentices (%)	4.26	3.71	6.11	5.84
Skilled workers (%)	76.46	23.05	76.84	23.76
Exporter (yes = 1)	0.75	0.39	0.55	0.45
Single establishment (yes = 1)	0.70	0.40	0.85	0.31
Workers participating in training programs (%)	18.88	19.01	14.72	16.59
Establishments	647		562	

Source: The data set used is the IAB Establishment Panel for the years 2001–5.
Notes: The table is based on establishment-specific means over the years from 2001 to 2005 as used in the second step of the regression analysis. Compared with the 1,267 establishments in the first step, I lose 58 establishments due to missing data in the second step variables.

establishments with a maximum of 300 workers, and it contains a dummy for establishments with fewer than 101 workers. This firm-size dummy also captures productivity differences that may arise because of the increased legal rights of councils in firms with more than 100 workers. Since the reform of the WCA in 2001 implies substantial differences in council rights, I only considered the period from 2001 to 2005, and this netted 3,816 establishment-year observations on 1,267 different establishments.

Variables

Value added is defined as the difference between total sales and the cost of intermediate materials and services bought for production. Because different establishments produce output using different percentages of intermediate inputs, value added is a better approximation for economic performance than total sales and is what I used as the dependent variable in the production function. Value added is regressed on works council presence, the number of employees, and the value of the capital stock.[15] The other control variables are the percentages of part-time workers, temporary agency workers, apprentices, and skilled workers[16] in total employment; whether the establishment is covered by collective bargaining; the number

[15]The data do not contain direct information on the capital stock. I use an approach by Mueller (2008) to compute the capital stock from investment data.

[16]Skilled workers are craftsmen who have at least two years of formal professional education, or other employees who perform qualified tasks, i.e., also university graduates are included in that group.

of persons participating in employer-supported training programs; industry affiliation; location in the former East or West Germany; a dummy indicating whether the establishment has between 21 and 100 employees; the state of technology, whether the establishment exports and whether it is a single establishment.

The theoretical considerations I discussed earlier indicate that losses of firm-specific human capital due to personnel fluctuation may be important for productivity and related to council existence. The regressor "number of employees" controls for changes in the total amount of labor used in production. However, it does not control for fluctuations that leave the level of total employment unaffected. To deal with this, the churning rate is taken as an additional measure of fluctuation (see Burgess, Lane, and Stevens 2000).[17] The *churning rate* is a measure of separations that lead to replacement hiring and thus indicates fluctuations that do not affect total employment.

Empirical Model

The starting point of my analysis is a dynamic Cobb-Douglas production function that contains value added (Y), labor (L), capital (K), works council presence, and the above-mentioned control variables:[18]

$$\ln Y_{it} = \pi_0 + \pi_1 \ln Y_{i,t-1} + \pi_2 \ln L_{it} + \pi_3 \ln L_{i,t-1} + \pi_4 \ln K_{it} + \pi_5 \ln K_{i,t-1} + \delta Z_i + v_i + m_t + u_{it}, \tag{1}$$

where ν_i is an establishment-specific fixed effect, m_t captures time effects that are common to all establishments, and u_{it} is a white noise error term. The vector including the control variables and the works council dummy is denoted by Z_i while δ is the corresponding vector of coefficients. Note that the variables contained in Z_i are mostly time-invariant. The works council dummy in particular is almost time-invariant.

The primary challenge in my analysis is the question of how to deal with the joint existence of time-variant and time-invariant endogenous regressors. The regressor of interest is time-invariant. If there were only time-variant endogenous regressors, a GMM-SYS estimator as proposed by Arellano and Bover (1995) could be used to estimate their influence on the dependent variable consistently. The GMM-SYS estimator jointly estimates an equation in levels and an equation in first differences. For the levels equation, it uses lagged first differences as instruments and lagged levels as instruments for the first-differenced regressors in the other equation. Because the GMM-SYS estimator relies on first differences, coefficients of time-

[17]The churning rate is the difference between the total work flow rate (WF) and the absolute value of the net change rate (NET) in employment. WF is the share of hired (WIF) plus the share of displaced workers in total employment (WOF), and *NET* = *WIF* – *WOF*.

[18]In robustness checks presented in Table 4, a translog production function is also estimated. The results are qualitatively similar.

invariant or nearly time-invariant regressors cannot readily be identified. This problem can be tackled using a two-step approach: in the first step, the following production function is estimated via GMM-SYS

$$\ln Y_{it} = \pi_0 + \pi_1 \ln Y_{i,t-1} + \pi_2 \ln L_{it} + \pi_3 \ln L_{i,t-1} + \pi_4 \ln K_{it} + \pi_5 \ln K_{i,t-1} + m_t + error_{it}, \tag{2}$$

where the vector Z_i is not included and therefore remains in the establishment-specific fixed effect, which is part of the overall error term $error_{it}$. In the second step, the residuals from Equation (2) are regressed on the establishment fixed effect $\delta Z_i + \nu_i$. The procedure has the advantage of estimating the influence of the time-variant input factors capital and labor consistently with GMM-SYS in the first step, and additionally obtaining the coefficients of the time-invariant variables (e.g., works council existence) in the second step.

The dependent variable for the second step is the fixed effect of each establishment. To obtain it, I first generated the predicted values for $\ln Y_{it}$ from Equation (2) and subtracted it from the observed values.

$$\ln Y_{it} - \widehat{\ln Y_{it}} = \delta Z_i + v_i + error_{it}. \tag{3}$$

I then averaged that value for the period 2001–5 for each establishment to get an estimate of the establishment-specific time-invariant component of the first step residual, that is, $\delta Z_i + \nu_i$. If *error* is a zero mean error term, averaging over time will eliminate or at least substantially reduce its contribution to the residual. The second step estimation equation is

$$R_i = \delta_0 + \delta Z_i + \widetilde{error_i} \tag{4}$$

with

$$R_i = \tfrac{1}{T} \Sigma_t \ln Y_{it} - \widehat{\ln Y_{it}}.$$

Oaxaca-Blinder Decomposition

An interesting alternative to estimating Equation (4) directly with OLS is the Oaxaca-Blinder decomposition, introduced by Oaxaca (1973) and Blinder (1973), which breaks down the output differential between two groups into explained and unexplained components. The decomposition rests on estimating separate works council and non–works council equations. The output differential between establishments with a council (C) and establishments without (N) can be broken down in the following way:

$$R_C - R_N = \delta_N (Z_C - Z_N) + Z_C (\delta_C - \delta_N) + (error_C - error_N). \tag{5}$$

$R_C - R_N$ is the mean output differential, Z_C and Z_N are vectors of mean values of the independent variables (including an intercept) and δ_C and δ_N are estimated coefficient vectors. Equation (5) says that the output differential is decomposed into a part due to differences in endowments evaluated at the

non–works council establishment coefficients and a part due to differences in coefficients evaluated at the mean values of the council group. The first part of Equation (5) can be interpreted as the difference in output the non-council group would achieve if it had the other group's endowments, that is, the explained part of the output gap. The second part represents the difference in output the group with councils would experience if it had the same productivity as the non-council group: that is, the unexplained part or, if assuming random assignment of councils to establishments, the effect on the establishments actually treated. My aim is to assess the lower boundary of this effect.

As proposed by Winsborough and Dickinson (1971), the average effect on the group of works council establishments can be estimated using a threefold decomposition of the output differential

$$R_N - R_C = \delta_C(Z_N - Z_C) + Z_C(\delta_N - \delta_C) + (\delta_N - \delta_C)(Z_N - Z_C). \tag{6}$$

While the unexplained part in the second line is the desired effect on the works council establishments,[19] the term in the third line indicates whether the council establishments accumulate more or less of such endowments for which they have a productivity advantage over the non–works council establishments.

Self-Selection into Works Council Regimes

Workers have the right to set up or close down a works council. Hence, they select their establishment into one of two possible regimes, having a council or not. If the self-selection mechanism is systematically related to establishment productivity, OLS estimates of the council effect and the Oaxaca-Blinder decomposition are biased; however, for at least some self-selection patterns the direction of the OLS bias is clear.

Consider the case where there are unobserved factors that increase the incentive of workers to establish or maintain a works council but, at the same time, are negatively correlated with productivity. In that case, the output differential to be decomposed is too small (i.e., random assignment of councils to establishments would increase it) and Oaxaca-Blinder decomposition will lead to underestimation of the council effect. In the Appendix, I show how to adjust the output differential and mimic a situation of random assignment of councils to establishments. The endogenous switching regression model described there assumes that there exist valid exclusion restrictions that identify the productivity effect of works councils. These restrictions are used to adjust the dependent variable in Equation (4) and lead to a selectivity-adjusted output differential in Equation (6). Assuming valid exclusion restrictions, the productivity effect from estimating Equation (6) with the adjusted output differential is the true effect of council existence.

[19]This decomposition leads to a negative output differential. Hence, the second term is negative if the council establishments have a productivity advantage.

Table 2. First Step GMM-SYS Estimation

L1.log (value added)	.392*** (.035)
Log (number of employees)	.379* (.211)
L1.log (number of employees)	.026 (.238)
Log (capital stock)	.552*** (.137)
L1.log (capital stock)	–.408*** (.102)
Intercept	5.271*** (.886)
Observations	3,816
Establishments	1,267

Source: The data set used is the IAB Establishment Panel for the years 2001–5.
Notes: The dependent variable is log value added. Year dummies are included. L1 is the one-period lag operator. Results are obtained using 101 GMM-style internal instruments as explained in the text. Neither the Sargan test of overidentifying restrictions nor the Arellano-Bond test for autocorrelation in the first differenced errors indicates misspecification of the model. Standard errors are given in parentheses; *** and * denote significance at the 1% and 10% level, respectively.

Results

Before applying the empirical approach I have outlined, I start with a baseline OLS estimation of a static Cobb Douglas production function[20] that includes all control variables as well as industry and year dummies. The works council coefficient of 0.115 indicates that works councils are associated with a 11.5% higher productivity. The coefficient is statistically significant at the 1% level.

The results of estimating Equation (1) with GMM-SYS are reported in Table 2.[21] After having controlled for capital and labor, the (non-selectivity-adjusted) output differential $R_C - R_N$ amounts to 19.1%, indicating that establishments with a works council produce, ceteris paribus, on average 19.1% more value added. This is not interpretable as a productivity effect of works councils because other establishment characteristics have not been controlled for so far.

Oaxaca-Blinder Decomposition

The decomposition of the first-step residuals is based on the regressors as listed in Table 1, and the results are presented in Table 3.[22] Two-thirds of the

[20]The results are available on request from the author.

[21]I used twice and more lagged levels of the output variable, at least threefold lagged levels of the input variables and at least simple lagged levels of time dummies as instruments in the first differenced equation. For the levels equation, I used at least once-lagged first differences of the output variable and at least twice-lagged first differences of the input regressors are used as instruments. The total number of instruments is 101, and the Sargan test of over-identifying restrictions suggests no misspecification of the model ($Prob > chi^2 = 0.73$). The Arellano-Bond test for autocorrelation in the first-differenced errors does not reject the hypothesis of no autocorrelation ($Prob > z = 0.13$).

[22]The decomposition is conducted using the Oaxaca command in Stata. For computation of standard errors, see Jann (2008).

Table 3. Oaxaca-Blinder Decomposition

Unadjusted Differential	
Prediction with council	0.078*** (0.018)
Prediction without council	–0.113*** (0.018)
Output differential	0.191*** (0.026)
Decomposition	
Endowments	0.167*** (0.032)
Coefficients	0.064 (0.042)
Interaction	–0.040 (0.045)

Source: The data set used is the IAB Establishment Panel for the years 2001–5.
Notes: The dependent variable is the within-firm average of the first step GMM-SYS residual; 15 sectoral dummies and (the within-firm averages of) all variables from Table 1 are included. The decomposition is evaluated at the council establishments' endowments and positive numbers for the decomposition results indicate advantages for the council group. Robust standard errors are given in parentheses and *** denotes significance at the 1% level.

output differential can be explained by different endowments and interaction effects. The unexplained part amounts to 6.4% and reflects a higher productivity of works council establishments; this means that, after having controlled for all available information (but not for self-selection), council establishments create on average 6.4% more value added.[23]

The central result is the positive 6.4% productivity effect of works councils on works council establishments. The true effect, however, is likely to be larger than 6.4%.

Underestimation of the Council Effect

There are at least two arguments for considering the estimated productivity effect of 6.4% on the works council establishments a downward biased estimate of the true effect. The first argument stems from the well-known phenomenon of decreasing productivity during cyclical downturns due to labor hoarding. *Labor hoarding* means that establishments do not fully adjust their labor input to decreasing production. The consequence is lower utilization of production capacity and therefore lower productivity. The period under examination in this study, 2001–5, is marked by a cyclical downturn of the German economy with an average annual real GDP growth rate of 1.5% in the manufacturing sector, while in 2000 and 2006, growth rates were around 7%.[24] Assuming that stronger employment protection in works council establishments increases labor hoarding, the productivity effect of councils is higher in cyclical upturns and therefore underestimated in this study.

[23]Being aware of the criticism of Jones (1983), I will not interpret the contribution of each regressor to the unexplained part.

[24]German Federal Statistical Office (2008).

Table 4. Oaxaca-Blinder Decomposition, Preferred Specification, and Sensitivity Analysis

Variable	*Preferred specification*	*21–200*	*21–500*	*51–500*	*1996–2006*	*Trans-log*	*Fixed effects*	*Mean over robustness checks*
Unadjusted output gap	0.19	0.17	0.18	0.27	0.24	0.14	0.53	0.26
Adjusted output gap (AGE and FIRMAGE)	0.36	0.29	0.37	0.72	0.36	0.33	0.83	0.48
Adjusted output gap (AGE)	0.41	0.35	0.43	0.81	0.39	0.39	0.84	0.54
Adjusted output gap (FIRMAGE)	0.37	0.29	0.38	0.76	0.36	0.35	0.80	0.49
Unadjusted productivity effect	0.06	0.06	0.06	0.08	0.09	0.07	0.21	0.10
Adjusted prod. effect (AGE and FIRMAGE)	0.40	0.32	0.41	0.92	0.40	0.45	0.95	0.58
Adjusted prod. effect (AGE)	0.50	0.43	0.51	1.06	0.45	0.55	0.94	0.66
Adjusted prod. effect (FIRMAGE)	0.41	0.33	0.42	0.98	0.39	0.46	0.91	0.58

Notes: The table presents results from Oaxaca-Blinder decompositions applied to different samples (due to different firm size cutoffs or time periods), production function specifications, first step estimators, or second step instruments, as explained in the text. AGE and FIRMAGE are exclusion restrictions. AGE is the within-firm standard deviation in workers' age obtained from the Linked Employer-Employee Data Set of the IAB. FIRMAGE is a dummy indicating whether the establishment existed prior to 1990 derived from the IAB Establishment Panel.

Evidence supporting this argument is the fact that inclusion of the years 1996 through 2000 increases the productivity effect by 3 percentage points (column 5, Table 4).[25]

The second argument stresses potential self-selection into the works council regime. Workers of poorly performing establishments may choose to maintain a works council to protect their rents.[26] If this is true, the productivity estimate of council existence is confounded by a situation of poor establishment performance that is not caused by the council and, therefore, the estimate is downward biased.

The selectivity-adjusted results are presented in Table 4. The first column summarizes the results for the preferred specification I have used throughout. The other columns show robustness checks. The first row contains the predicted output differential without selectivity adjustment. The second row contains the same differential after adjusting for selectivity using both exclusion restrictions as described in the Appendix. In rows three and four, I adjust the differential by using the first or second exclusion restriction, respectively. In rows five to eight, the productivity effects from the Oaxaca-Blinder decomposition are reported in the same order. While there is some variation in the productivity effect, depending on the exclusion restrictions,

[25]For the period from 1996 to 2007, Mueller (2011a) presents similar results.

[26]For a discussion, see Jirjahn (2009). Further evidence supporting the hypothesis of a higher probability of council introduction in times of bad firm performance is found in Addison, Bryson, Teixeira, Pahnke, and Bellmann (2009) and Kraft and Lang (2008).

the general direction is obvious. The adjusted output gap and the productivity effect are clearly higher than the estimates from the unadjusted case and, thus, indicate underestimation due to self-selection.

Taken together, the argumentation and the empirical evidence that I have presented here suggest that the 6.4% estimate of the productivity effect of works councils is underestimating the true effect.

Sensitivity Analysis

To check whether changes in the sample, the methods, or the empirical specification affect results and to assess the robustness of the results, I apply the empirical procedure to different samples; and, in addition, I modify the first step of the empirical procedure and apply it to the original sample. Along with the results of the original specification in the first column, Table 4 contains the Oaxaca-Blinder decomposition results of the robustness checks.

All columns, except columns six and seven, are based on GMM-SYS estimations of Equation (1) in the first step. Columns two, three, and four contain the results for alternative firm-size cutoff values, while in column five, I extend the original sample by using all available years from the data. To derive column six, the Cobb Douglas specification in Equation (2) is replaced by a translog specification. In column seven, the first step Equation (2) is estimated in its static representation via a fixed effects within estimator instead of GMM-SYS.[27] Column eight reports the arithmetic mean values of the robustness checks of columns two to seven.

The results without selectivity adjustment, reported in rows one and five, are fairly robust. Column eight indicates an average predicted output differential of 26% and an average productivity difference of 10% in favor of establishments with a works council. The productivity effect is higher for larger establishments (column four) and further increases if years prior to 2001 are included, a translog production function is used, or fixed effects instead of GMM-SYS techniques are applied. This suggests that my preferred specification in column one is conservative.

Discussion

Most economists expect the nonunion participation of employees in establishment-level decision-making to have desirable social effects, such as workplace democracy or the enforcement of legal standards in working conditions and environmental protection. But there is no unambiguous empirical evidence about the economic efficiency of such participation. I examined German works councils, one prominent example of formal nonunion participation, to assess their influence on establishment productivity.

[27]I used the static specification instead of the dynamic because the fixed effects estimator is inconsistent in the presence of a lagged dependent variable (Greene 2007: 244).

Data on roughly 1,200 small to medium-size German manufacturing establishments were taken from the 2001–5 waves of the Linked Employer-Employee Panel of the Institute for Employment Research (IAB). A GMM-SYS estimator addressed the endogeneity of capital and labor in the production function. After controlling for capital and labor, I decomposed the remaining output differential between establishments with a council and establishments without a council into explained and unexplained parts and estimated a positive productivity effect of works council existence of 6.4%. Further economic and empirical arguments as well as my attempt to control for self-selection into the council regime indicate that the estimated effect of 6.4% is a downward biased estimate of the true effect.

When evaluating a legal mandate for works councils from an economic perspective, society is concerned with the impact on economic surplus. A case in point is that the German federal government, in the preamble to its draft legislation for the 2001 reform in the Works Constitution Act, argued that "the benefit of an operational system of codetermination outweighs the additional expense" (Addison, Bellmann, Schnabel, and Wagner 2004: 400). A positive productivity effect therefore provides an economic justification for the legal mandate for works councils in Germany.

A positive productivity effect of works councils, however, also raises the question of why works councils have to be mandatory at all. The standard answer can be borrowed from Freeman and Lazear (1995). Their model is able to predict positive productivity effects together with reduced profits, and the latter can explain why employers would refuse the introduction of such an institution in the absence of a legal mandate. The majority of empirical work supports the notion of reduced profits. In a recent paper (Mueller 2011b), I criticized the subjective profit measures used in those studies and presented positive effects with objective profit measures. But, even if profits are not reduced by the existence of works councils, there are alternative explanations of the need for a legal mandate. Among these explanations are managerial risk aversion and a possible difference between the short- and long-term effects of works councils (ibid.). Additionally, managers may oppose the introduction of powerful works councils because managers may trade the expected productivity gains against their own loss in power and managerial prerogatives. These arguments can explain why a legal mandate serves as a precondition for the evolution of nonunion workplace representation, even in the absence of adverse effects of such representation on labor or capital income.

Appendix

The self-selection into a works council regime is described using an endogenous switching regression model.[28] If the utility of having a council is higher than its costs, workers will choose to maintain a works council. Even though the researcher cannot observe the utility,

[28]Also called Roy Model. See Maddala (1983).

the workers' choices are observed. The endogenous switching regression model can be estimated using the Heckman two-step estimator (Heckman 1979). The latent utility of having a council is

$$W_i^* = \gamma' Z_i + \tau' I_i + u_i \tag{7}$$

with Z_i as the vector of second step regressors from Equation (4), I_i as a vector of exclusion restrictions, γ' and τ' as coefficient vectors and u_i as a random error. The observed choices are

$$W = 1 \ \textit{if} \ W^* > 0$$
$$W = 0 \ \textit{if} \ W^* \leq 0$$

with W as a dummy indicating the presence of a works council. The output equations can be estimated consistently with

$$R_{Ci} = \alpha_C + \delta'_C Z_i + \sigma_C \left(\frac{\phi(\hat{\gamma}' Z_i + \hat{\tau}' I_i)}{\Phi(\hat{\gamma}' Z_i + \hat{\tau}' I_i)} \right) + \varepsilon_{Ci} \text{ if } W = 1 \tag{8}$$

$$R_{Ni} = \alpha_N + \delta'_N Z_i + \sigma_N \left(-\frac{\phi(\hat{\gamma}' Z_i + \hat{\tau}' I_i)}{1 - \Phi(\hat{\gamma}' Z_i + \hat{\tau}' I_i)} \right) + \varepsilon_{Ni} \text{ if } W = 0 \tag{9}$$

where $\hat{\gamma}' Z_i + \hat{\tau}' I_i$ is the linear prediction from Equation (7), $\phi(\hat{\gamma}' Z_i + \hat{\tau}' I_i)$ is the density function evaluated at $\hat{\gamma}' Z_i + \hat{\tau}' I_i$ and $\Phi(\hat{\gamma}' Z_i + \hat{\tau}' I_i)$ is the cumulative distribution function at this point.[29] Hence, the expressions after σ_C and σ_N are the inverse Mills ratios, accounting for the nonrandom selection into works council regimes.

Having estimated Equations (8) and (9), the output differential ($R_N - R_C$) can be adjusted by subtracting $\hat{\sigma}_C \left(\frac{\phi(\hat{\gamma}' Z_i + \hat{\tau}' I_i)}{\Phi(\hat{\gamma}' Z_i + \hat{\tau}' I_i)} \right)$ and $\hat{\sigma}_C \left(-\frac{\phi(\hat{\gamma}' Z_i + \hat{\tau}' I_i)}{1 - \Phi(\hat{\gamma}' Z_i + \hat{\tau}' I_i)} \right)$ from both sides of the respective equation (e.g., Reimers 1983). Hence, the selectivity-corrected dependent variables are $R^*_{Ci} = R_{Ci} - \hat{\sigma}_C \left(\frac{\phi(\hat{\gamma}' Z_i + \hat{\tau}' I_i)}{\Phi(\hat{\gamma}' Z_i + \hat{\tau}' I_i)} \right)$ and $R^*_{Ci} = R_{Ci} - \hat{\sigma}_C \left(-\frac{\phi(\hat{\gamma}' Z_i + \hat{\tau}' I_i)}{1 - \Phi(\hat{\gamma}' Z_i + \hat{\tau}' I_i)} \right)$. Imitating random assignment of works councils, the corrected output differential ($R^*_N - R^*_C$) is decomposed using Equation (6).[30]

Although the endogenous switching regression model is identified through nonlinearities, additional exclusion restrictions will improve identification. Appropriate exclusion restrictions have to be uncorrelated with the errors in Equations (7), (8), and (9) but should explain as much variation in W as possible. As I have only one observation per firm (i.e., the within-firm average of the residual from the GMM-SYS regression) and no experimental situation, I cannot argue that potential exclusion restrictions will meet these criteria perfectly. But my goal is only to check the direction of the selection bias. If the selection correction increases the productivity effect, it becomes unlikely that the true council effect is negative.

Acknowledging that valid exclusion restrictions are hard to find, I construct one exclusion restriction using the employee dimension of the data in order to reflect worker heterogeneity within establishments. The heterogeneity measure is the within-establishment standard deviation in workers' age. As a homogenous work force is assumed to agree more easily on electing and running a works council,[31] I expect the heterogeneity measure to be negatively correlated with council existence. While the average age of an establishment's workforce may influence productivity and would therefore be an invalid exclusion restriction, it is less obvious why the dispersion in workers' age should do so.

Additionally, I chose an establishment age indicator as an exclusion restriction. The older an establishment, the greater the chance a group of employees will have initiated a council

[29]For consistency of the endogenous switching regression model one has to assume that u_i, ε_{Ci} and ε_{Ni} follow a trivariate normal distribution.

[30]See Neuman and Oaxaca (2004) for a methodological analysis of decompositions with selectivity corrected equations.

[31]See Freeman and Medoff (1984) and Demsetz (1993) for a discussion of worker heterogeneity and union representation elections.

election at some point in time and, given the persistence of work councils, the greater the likelihood that a works council exists; however, establishment age may be correlated positively with productivity due to a higher chance of survival of the more productive firms (see Wagner 2010 for a recent study using German data). To mitigate this problem, I do not use establishment age directly but a dummy variable indicating whether the firm existed before the year 1990 or not.[32] The dummy ensures that also in the group of establishments founded 1990 or later, the majority has survived infancy and proved to be competitive. In particular, the median year of establishment foundation in that group of 639 plants is 1993, the average establishment age in 2003 was 9.9 years, and about 90 percent of the plants existed since 1998 or earlier.

Hence, the exclusion restrictions used in selection Equation (7) are (the first figure in parentheses is the pair wise correlation coefficient with council existence and the second figure is the associated *p*-value for a test of the hypothesis that this correlation coefficient is equal to zero):

1. FIRMAGE: = dummy variable = 1 if the firm was established prior to the year 1990 (0.130; 0.000)
2. AGE: = the within-establishment standard deviation of employee age (–0.193; 0.000).

The reported signs for the correlation coefficients with council existence coincide with *a priori* expectations: establishments with a high degree of heterogeneity in workers age are significantly less likely to have a works council, while older establishments are more likely to have one.

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[32]An OLS regression of Equation (4), which additionally includes the age dummy, gives a coefficient of the age dummy of 0.04 with t-value 0.92. Although this is not a valid test on the exogeneity of firm age, it shows at least no obvious connection between instrument and productivity.

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