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John T. Addison

The Performance Effects of Unions. Codetermination, and Employee Involvement: Comparing the United States and Germany (With an Addendum on the United Kingdom)

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The Performance Effects of Unions. Codetermination, and Employee Involvement: Comparing the United States and Germany (With an Addendum on the United Kingdom)

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EUROPÄISCHES INSTITUT FÜR INTERNATIONALE WIRTSCHAFTSBEZIEHUNGEN (EIIW)/
EUROPEAN INSTITUTE FOR INTERNATIONAL ECONOMIC RELATIONS
Bergische Universität Wuppertal, Campus Freudenberg, Rainer-Gruenter-Straße 21, D-42119 Wuppertal, Germany
Tel.: (0)202 – 439 13 71
Fax: (0)202 – 439 13 77
E-mail: welfens@uni-wuppertal.de
www.euroeiiw.de

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Summary: Drawing on evidence from the United States and Germany, this paper offers a survey of the effects of worker representation (in unions and works councils) and innovative work practices on firm performance. The interaction between worker representation and high performance work practices provides a practical means of peering inside the black box of the collective voice model, even if there is as yet no well-determined hierarchy for productivity performance and certainly no blue-print for the future of unions. An addendum sketches the British evidence.

Zusammenfassung: Basierend auf der Evidenz für die USA und Deutschland gibt dieses Papier einen Überblick über die Effekte der Arbeitnehmervertretung in Unternehmen (via Gewerkschaften bzw. Betriebsräten) und die Wirkung innovativer Arbeitsplatz–Praktiken auf die Leistung von Unternehmen. Indem der Zusammenhang zwischen Arbeitnehmervertretung und auf Hochleistungen ausgerichteten Arbeitsplatz-Praktiken dargestellt wird, ergeben sich Einsichten in die Black Box des Modells „kollektiven Widerspruchs“ (collective voice); allerdings gibt es bislang noch keine klar bestimmte Hierarchie bezüglich der Produktivitätsentwicklungen und sicherlich auch kein allgemeines Modell zur Zukunft der Gewerkschaften. In einem Ergänzungsteil werden die Einsichten aus Großbritannien thematisiert.

Prof. Dr. John T. Addison, Research Director Economics, Queen's University Belfast, and Hugh C. Lane Professor of Economic Theory, University of South Carolina.

ecceaddi@moore.sc.edu

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1. Introduction

In this paper we examine the associations between worker representation (i.e. in unions and works councils), employee involvement/innovative work practices, and various indicators of firm performance.[1] The two themes of workplace representation and innovative workplace practices have historically been analyzed separately, although in recent years they have shown more overlap. There are a number of reasons for this historical apartheid. First, the (linking) theme of collective voice was first applied to unions, where it shared equal billing with unionism's monopoly face.[2] Second, employee involvement has tended to be seen as management-led and thus as a human resource management technique emphasizing high-commitment employment practices. (At the price of some imprecision, we will equate innovative work practices with high performance work practices and use both interchangeably with employee involvement.) Third, and coinciding with the decline in unionism and growth in human relations practices, there has been the suggestion that the unions and employee involvement are alternatives.[3]

On the other hand, several other forces have encouraged a more integrationist approach. First, developments in the collective voice model have emphasized cooperation and the possibility that institutional innovation might allow a decoupling of distribution from production and workplace issues. Second, the reduced bargaining power of unions might have produced the same result and elevated the pro-productive aspects of unionism subsumed under collective voice. The bottom line is that although most analyses of worker representation and employee involvement/high performance work practices have been conducted in isolation – while sometimes including the other as a control – research is beginning to consider their interaction.

In the present treatment, we will consider developments in the United States and Germany, only noting the British literature in qualification and en passant. The U.S. experience is of interest because it provides one of the least positive assessments of union impact while yet offering some early evidence of there being a mutually supportive relationship between union presence and employee involvement. The German experience is of interest because workplace representation occurs through the mechanism of the works council rather than the union. Historically, the works council has been viewed as the exemplar of collective voice because of its array of information, consultation, and participation/codetermination rights. Latterly, with the recognition of the bargaining problem, the German institution has become ever more closely identified with the expression of pro-productive voice by reason

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[1] The composite employee involvement/innovative work practices has no settled meaning. I will use it to include profit-sharing/share ownership arrangements, consultative bodies, team working, quality circles and problem-solving groups, briefing groups, systematic use of the management chain to communicate, and regular meetings with senior management plus benchmarking, total quality management (TQM), training, job security, job rotation, and payment for skill acquisition, *inter al*.

[2] There is inevitably some artificiality in this separation. For example, some models in the spirit of collective voice stress that successful employee involvement requires the presence of a union before workers will practice consummate as opposed to perfunctory cooperation (LEVINE/TYSON, 1990).

[3] For an exhaustive set of tests of the hypothesis for Britain, see MACHIN/WOOD (2005).

of its ‘peace obligation’ and the dual system of industrial relations within which it is embedded. That said, there has been comparatively little analysis of the interaction of workplace representation with more direct employee involvement mechanisms, although analysis of the training function might provide a promising bridge.

The plan of the paper is as follows. To set the scene for our discussion of the empirical evidence, we first offer some theoretical conjectures on the efficiency properties of worker representation and employee involvement mechanisms. We next discuss for the United States the impact on firm performance of unions, employee involvement/high performance work practices, and their interaction. We follow this with a broadly parallel analysis for Germany, now with works councils substituting for the union institution. An interpretative section concludes.

2. Theoretical Conjectures

The arguments favouring unionism, works councils, and employee involvement/high performance work practices (EI/HPWP) are closely linked. Thus, the principal works council model is unambiguously an extension of the collective voice model, first advanced to make the case for unionism; the scope for EI/HPWP to improve performance rests on many of the same arguments used in the voice model; and the innovative work practices identified in the EI/HPWP literature may pierce the veil of the collective voice model which is opaque on mechanisms.

The collective voice model advanced by FREEMAN/MEDOFF (1984) is properly represented as a union voice-institutional response model. While arguing that voice is synonymous with (autonomous) unions, the authors are also concerned to make the point that voice cannot succeed without an appropriate response from management (and then from unions in response to any changes proposed by management). FREEMAN/MEDOFF (1984, p 165) write: “Some managements will adjust to the union and turn unionism into a positive force at the workplace; others will not. Over the long run, those that respond positively will prosper while those that do not will suffer in the market place.”

The centrepiece of collective voice is the union role in providing information. The labour market context is important here: it is characterized by continuity rather than spot market contracting because of on-the-job skills specific to the firm and the costs attaching to worker mobility and labour turnover. Given the information problem in such complex and multidimensional continuity markets, there are two basic mechanisms to elicit information on worker preferences or discontent. Quit behaviour can provide such information either inferentially or directly (via exit interviews). However, the collective voice model contends that such information is likely to suffer from selection biases, from problems of motivating the worker to disclose information when there is no benefit from doing so (and the certainty of some positive cost), and finally from the sheer cost of the process of trial and error in determining the efficacy of contract innovations.

The other mechanism is voice. Collective voice through the agency of a union may outperform individual voice for several reasons. One reason is that non-rival consumption

of shared working conditions (e.g., safety conditions, line speeds, and grievance procedures) and common workplace rules create a public goods problem of preference revelation. Without some collective form of organization, there will be too little incentive for the individual to reveal his or her preferences since the actions of others may produce the public good at no cost to that individual. Unions collect information about the preferences of all workers and 'aggregate' them to determine the social demand for such public goods. Substituting average preferences for marginal preferences and arbitraging of worker preferences may be efficient in such circumstances. Unions can determine the social demand for such goods, thereby enabling firms to choose a more efficient mix of personnel policies.

A second public goods dimension of the workplace stems from the nature of the input of effort. Without some form of collective organization, so this argument runs, the individual's incentive to take into account the effects of his actions on others may be too small, just as with preference revelation. This problem will only arise where there are significant complementarities in worker effort inputs, so that output may depend on the lowest level of input by any one worker. In short, collective organization may potentially increase output through a joint determination of effort inputs and perhaps more so through increased cooperation between workers in continuity labour markets.[4]

The expression of collective voice is expected to reduce exit behaviour: quits, absenteeism, malingering, and even "quiet sabotage." The reduction in quits in particular is expected to lower hiring and training costs and increase firm-specific investments in human capital. Apart from training effects, lower quits (inter al.) should also occasion less disruption in the functioning of work groups. Reduced exit behaviour is the most tangible source of potential efficiency gain (to the parties) in the model.

The other main aspect of collective voice is governance. In the context of the continuity relation, governance refers to the policing or monitoring of incomplete employment contracts. Governance will involve the use of grievance and arbitration procedures and other mechanisms to mitigate problems stemming from the authority relation. Such arrangements should help improve the flow of information between the two sides. The difficulty is that these specialized procedural arrangements are not unique to union settings, so that the argument presumably must be that unions make it easier (i.e. less costly) to negotiate and administer these arrangements. Unions may then facilitate long-term efficient contracting. A union specializing in information about the contract and in the representation of workers can prevent employers from engaging in opportunistic behaviour. Workers may withhold effort and cooperation when the employer cannot credibly commit to take their interests into account. Fearing dismissal, workers may be unwilling to invest in firm-specific skills or disclose information facilitating pro-productive innovations at the workplace.5 The formation of a union and the introduction of a system

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4 For the public goods argument to have force, two further conditions must be met – both of which are contained in FREEMAN (1976, p. 362). First, costs must be incurred in using external markets: if quitting were costless, the individual worker could simply choose the employer whose working conditions most closely approximated his/her own preferences. Second, the workplace must continue to be buffeted by unforeseen shocks that change the nature of the workplace in an informational context; otherwise, there would be no need for the union's demand-revealing function after the formative match between employer and worker.

5 The notion that unions might help increase training has formally been allied to contract enforcement by DUSTMANN/SCHÖNBERG (2004), who argue that the unavailability/infeasibility of long-term wage agreements

of industrial jurisprudence is one way of protecting employees' interests. In this way, unions may generate worker cooperation, including the introduction of efficiency-enhancing work practices. In other words, if the reputation effects mechanism is weak, there is scope for unionism to be pro-productive.

If we assume that there is a commitment problem in regular markets, an interesting side issue is whether the divorce of ownership and control in the modern corporation could make self-enforcing contracts more feasible. More feasible in the sense that management might be less interested in reneging on an implicit contract in the interest of short-term profit maximization than the owner principal; and conversely where the interests of managers and shareholders are more closely aligned by, say, profit- sharing schemes for managers. In this case much might hinge on whether unions and self-enforcing contracts are substitutes or complements in establishing workplace cooperation. If they are substitutes, any positive effect of unions on performance will be stronger in firms with less severe agency problems. If they are complements, unions will be more effective in firms where agency stimulates self-enforcing contracts. This argument is of course based on a very narrow view of the agency problem in corporations and must be widened to incorporate rent-seeking behaviour by managers which may detract from trustful and cooperative industrial relations and may decrease the range of feasible self-enforcing contracts. JIRJAHN (2003) has recently examined the relationships between unions (actually works councils) and self-enforcing contracts and also those between agency and trustful, cooperative industrial relations using information on management profit-sharing schemes. We shall report some of his findings when looking at the German evidence.

While governance receives emphasis, there is virtually no discussion of bargaining power in the original collective voice model. But in contract theory models in which the union can make credible the employer's ex ante promises there must be some threat of credible punishment by the union (e.g., MALCOMSON, 1983). So it seems that the governance argument also depends on power: union monopoly power. Unfortunately, such power generally involves a hold-up problem, with unions taxing the returns on tangible and intangible capital.

The standard collective voice model treats the exertion of bargaining power and the expression of voice as distinct and offsetting facets of unionism (hence the reference to the "two faces" of unionism in FREEMAN/MEDOFF, 1984, p 5). Recognition of bargaining power is integral to the main theoretical justification for works councils in a model offered by one of the architects of collective voice. Thus, FREEMAN/LAZEAR (1995) argue that participation/codetermination will be underprovided by the market because institutions that give power to workers will affect the distribution as well as the size of the surplus. The ideas behind collective voice are fleshed out and set in a continuum bounded by information provision at one end and by participation or codetermination at the other.

Freeman and Lazear argue that the joint surplus of the enterprise will increase as one moves cumulatively from information exchange through consultation to participation.

means that training will be underprovided in regular markets and that unions move (apprenticeship) training closer to the social optimum by guaranteeing trained workers at least the union wage in the future. Since wage compression is also involved, unions facilitate firm-financed general training in this model (see also ACEMOGLU/PISCHKE, 1999). The most recent British evidence is provided in ADDISON/EELFIELD (2007)

Among other things, information rights can help verify management claims as to the state of nature, rendering them credible to the workforce and avoiding costly disputes that might even threaten the survival of the enterprise. Consultation for its part allows new solutions to production and other problems by reason of the non-overlapping information sets of the two sides and the creativity of discussion. Finally, participation or codetermination rights increase the joint surplus by providing workers with more job security and encouraging them to take a longer-run view of the firm and its prospects.

However, Freeman and Lazear recognize that, unless constrained, these rights will give rise to a bargaining problem. Specifically, they argue that the workers' share in the joint surplus grows with the surplus while that of capital declines both relatively and absolutely. The workers' share rises because knowledge and involvement are power, so that the very factors that cause the surplus to rise also cause profitability to fall, with the result that workers will demand too much power/involvement because their share will continue to rise after the joint surplus has peaked. Symmetrically, employers will either oppose works councils or vest them with too little power because profits decline even as the surplus is increasing.

Some means of third-party regulation limiting bargaining power has to be found if the societal benefits of worker voice are to be realized. Here, Freeman and Lazear see the German institution as attractive in two respects. First, the German works council cannot strike. Second, neither can it formally engage in bargaining over wages and other conditions of employment unless expressly authorized to do so under the relevant industry-level or regional collective bargaining agreement. In this respect, the authors speak of a potential "decoupling" of the factors that determine the size of the surplus from those that determine its distribution. Left open is whether or not there is a sufficient decoupling in practice. Thus, even if the works council is an exemplary collective voice institution, theory does not provide an unambiguous answer as to its consequences for efficiency.

Finally, the starting point of the EI/HPWP model is the notion that "workplace innovations change the production function in such a way as to increase the productivity of a firm's inputs, in particular labour" (CAPPELLI/NEUMARK, 2001, p 739). The basic premise is by now familiar: workers have important private information and valuable insights into how to improve their jobs. There is therefore scope for beneficial trades once workers are trained and presented with better opportunities to exercise their skills through job redesign, decreased supervision, and involvement in decision making, and motivated to contribute through productivity bonuses (HANDEL/LEVINE, 2004, p 2). Recognition of these potentialities marks a shift in management philosophy from the status quo ante of traditional work systems and labor-management relations, even if there is considerable variation in how the new practices have been adopted in practice (for one taxonomy, see GODARD, 2004).

EI/HPWPs 'work' by encouraging workers to work harder and smarter, and by inducing structural changes that improve performance. The idea that workers will work harder is based on their enjoying work more when the job is interesting and where it provides feedback and rewards (i.e. job enrichment). The second element more clearly reflects the distinct input of the worker in efficient job (re)design, not least when there are complementarities in production. As noted by ICHNIOWSKI ET AL (1996, pp 301-302), the final element reflects such factors as cross training and flexible job assignment, which

can reduce the cost of absenteeism; decentralized decision making to self-managed teams, permitting a reduction in line management while benefiting communication; and training in problem solving and computer skills, which can increase the benefits of new information technologies. In other words, innovative work practices beget other changes that improve productivity independent of their effects on motivation.

The suggestion is that the various strands of employee involvement are interdependent and mutually reinforcing, Edgeworth complementarities. This is the notion of 'bundling,' namely, the idea that innovative high performance work practices are more effective when combined with supporting management practices (e.g., MILGROM/ROBERTS, 1995). As suggested earlier, compensation schemes such as profit sharing can incentivize employee involvement, and information disclosure and training can improve worker decisions at the same time as job security encourages them to take a long-run view of the firm and make suggestions. Another example is the potential synergies between job rotation, self managed teams, and pay-for-skill plans. However, this should not be taken to imply that the theory provides unambiguous guidance on either the identification or measurement of the bundles.

One other point needs to be made. Although many of these arguments are consonant with the voice model, the conjunction of the growth in EI/HPWP and the decline in unionism at least raises the possibility that the two may be substitutes, either by design or by effect (i.e., by enhancing worker satisfaction they may reduce the demand for unionism). This is not without consequence for the empirical work reviewed below in which the maintained hypothesis is often that the two institutions are complementary.

In sum, there are theoretical grounds for supposing that both collective voice and EI/HPWP can improve the productivity of the workplace. Some observers profess to see little difference in the arguments for workplace representation and EI/HPWP when the industrial relations system offers some means of some means of decoupling production from distribution issues. Others might still argue that traditional workplace representation through unions is important to the success of innovative work practices – by, say, providing greater assurance that a serious hearing will be given to employees' suggestions, or by virtue of union access to higher levels of management – or, backhandedly, that such practices offer a bigger payoff in union regimes with the elimination of restrictive practices, reminding us that in all such cases the monopoly face of unions has to be taken into account. Study of the effect of workplace representation on firm performance would seem to be quite closely bound up with the EI/HRWP issue. Moreover, comparisons between the United States and Germany might prove especially instructive.

3. U.S. Evidence

We next review U.S. findings on the determinants of firm performance, first distinguishing between union and employee involvement effects and then addressing the comparatively few treatments that have attempted to integrate the two mechanisms.

3.1 Union Effects on Firm Performance

The starting point for all analyses of union effects on firm performance must be BROWN/MEDOFF'S (1978) pioneering production function study of U.S. manufacturing, using aggregate two-digit industry data cross classified by state groups for 1972. Using an augmented Cobb-Douglas production function, Brown and Medoff estimate

$$\ln\left(Y/L\right) \approx \ln A + \lambda \ln\left(K/L\right) + (1-\lambda)(c-1)P$$

where Y is a value-added measure of output, L is total labour (comprising union labour L_u and nonunion labour L_n), A is a constant of proportionality, K is capital, λ and (1-λ) are the output elasticities of K and L, c indexes productivity differences between union and nonunion labour (c>1 indicating union labour is the more productive, and conversely for c<1), and P is union density, L_u/L.[6]

In this framework, the coefficient estimate for P yields the logarithmic productivity differential of unionized establishments. Assuming this derives solely from labor inputs, dividing this coefficient by (1-λ) gives the union labour productivity effect. Brown and Medoff estimate that the productivity of unionized establishments is between 25 and 27 percent higher than that of comparable nonunion plants, implying a union productivity effect of 35 to 36 percent. Interesting, as we shall see, some of the first production function studies for German works councils obtained similarly high estimates.

In the years since Brown and Medoff's study, evidence has steadily accumulated to the effect that average union effects in the United States are nowhere near as large as this. To start with, and abstracting from issues of restrictive functional form and limitations of value added as a measure of output, other similarly broadly-based studies have failed to confirm large effects. Perhaps the 'closest' study is by HIRSCH (1991) who estimates a variant of the Brown-Medoff model using data for a sample of around 570 publicly quoted companies over the sample period 1968-80, matched to union data for 1977. Hirsch's OLS value-added production function includes in addition to capital, labour, the stock of R&D per employee, union density, variables measuring firm and industry growth, industry concentration, and import competition. He reports negative and statistically significant coefficients for union density (of around -17 percent). These estimates fall in absolute magnitude, the more detailed the industry dummies included: from -12.3 percent (2-digit

6 The equation assumes constant returns to scale, which constraint is relaxed by adding a measure of establishment size, lnL, to the regressors.

level) through -8 percent (3-digit) to 3 percent (4-digit). Re-estimating the production function for each of 19 industries yields some positive coefficient estimates for union density – examples include textiles and apparel, and fabricated metal products – but the majority of union effects remain negative. While conceding that union effects will likely vary considerably by industry and cannot be estimated precisely with existing techniques and data bases, HIRSCH (1991, pp 104-105) nevertheless concludes that there is nothing to support the contention of large and statistically significant positive union productivity effects. Rather, union productivity effects are small on average and insufficient to offset the union wage differential.

We will return to the question of estimation technique (and the issues of omitted variables and union endogeneity) later in this discussion, but for completeness we should also note some findings from an earlier manufacturing industry study that are quite consistent with those of Hirsch. Using data from the Profit Impact of Market Strategy (PIMS) on 902 manufacturing businesses for 1970-80, CLARK (1984) estimates similar value-added equations and finds small but well determined coefficient estimates for the union variable in the range -2 to -3 percent. On this occasion, however, the point estimates are not sensitive to inclusion of detailed controls. The bottom line is that, contrary to Brown and Medoff, average union productivity effects are small and as likely to be negative as positive. This interpretation is consistent with other pieces of information having to do with union effects on profitability (and employment).

Before turning to these other performance outcomes, it is important to emphasize again that we are speaking of average union effects and not results from individual industry and firm-specific studies that in principle can avoid many of the econometric and data problems inherent in more aggregative studies (e.g. in the measurement of output and in tackling input endogeneity problems). Such advantages are achieved at the price of a loss in generality, however, and so the goal must be to use the unique perspective of such studies to help inform more aggregative exercises.

Perhaps the most important indirect piece of evidence against large pro-productive union effects of the magnitude suggested by BROWN/MEDOFF'S (1978) study is the U.S. evidence on profitability. Unlike the recent British evidence, every U.S. study points to reduced profitability in union settings. This result holds irrespective of the financial indicator used (price-cost margin, rate of return on sales or capital, or market valuation of the firm's assets/Tobin's q), unit of observation (aggregate industry, firm, or line of business), or methodology. On the basis of the 16 studies reviewed in ADDISON/HIRSCH (1989), unions are associated with 10 to 15 percent lower profitability. More recent studies provide confirmation of this central tendency and, again inconsistent with British results, contain little indication of any material change in the magnitude of the union effect over time (HIRSCH, 1991; HIRSCH AND MORGAN, 1994).

However, and again abstracting from issues of statistical inference, the profitability evidence is not without controversy because the union effect might just be a transfer and thus neutral from an efficiency perspective (assuming perfect capital markets). Indeed, this is the take of FREEMAN/MEDOFF (1984, p 186). Whatever the indications to the contrary in the earliest U.S. literature, however, subsequent research has indicated that unions do not capture a significant share of potential monopoly profits. For example, in his evaluation of profitability (two measures: Tobin's q and the rate of return on capital) in

513 firms, 1968-80, HIRSCH (1991) reports that although the four-firm industry concentration ratio is positively associated with profitability, the interaction between union density and concentration is both positive and statistically significant. In other words, the suggestion instead appears to be that union-nonunion differences in profitability are most substantial in highly competitive industries.

There are clearly other sources of union rents such as sales growth and protected markets. However, the source that has most exercised U.S. researchers is distinctly competitive: the current and future quasi rents – or normal returns – on firm investments. U.S. research consistently points to a strong negative association between unionism and investment in physical and innovation capital (HIRSCH, 1991; BRONARS/DEERE, 1993; BRONARS/DEERE/TRACY, 1994; CAVANAUGH, 1998; FALLICK/HASSETT, 1999). The fullest analysis is by HIRSCH (1991), who again presents pooled cross-section/time-series results for both types of investment in his sample of more than 500 firms. For capital investment he reports that the union firm with average coverage has annual capital investment that is 13 percent lower than its nonunion counterpart. The direct effect of unionism or the union tax on the returns to long-lived capital contributes a little under one-half of this effect. The other 7 percent is an indirect effect operating via the union impact on profitability, profits being an important determinant of capital investment. For R&D expenditures, unionized companies invest some 15 percent less than do comparable nonunion firms. Well over three-quarters of this effect is now direct, resulting from the union tax. We should also note that Hirsch reports that union coverage is negatively associated with the ratio of advertising expenditures to sales. Furthermore, union coverage is also positively related to the propensity to patent, which should reduce the liability of the firm to hold up, ceteris paribus. That said, union coverage is unrelated to the ratio of debt to equity, higher values of which might be expected to lessen exposure to hold up (see, inter al., BALDWIN, 1983).

The U.S. evidence on investments in tangible and intangible capital does not augur well for long-run productivity growth in unionized companies. However, this implication is not corroborated in the productivity growth literature, where the slower growth in unionized firms is due to a disproportionate presence of unionization in industries with slower growth. HIRSCH (2004) contends that the implication of slowed growth in union companies is not inconsistent with this result because productivity growth equations typically control for both tangible and intangible capital. Vulgo: they address only the direct effects of unions, neglecting the important indirect effect operating through reduced investment. Accordingly, Hirsch directs our attention to the emerging employment growth literature (e.g. LALONDE/MARSCHKE/TROSKE, 1996; DINARDO/LEE, 2002). He interprets the evidence on slowed employment growth in unionized firms as the teleological outcome of their reduced investments in physical and intangible capital. That said, there is some lingering ambiguity in the notion of an employment maximand, as well as the potentially awkward result that unionized firms in the United States are apparently no more likely to fail than their nonunion counterparts.[7]

[7] But for evidence of higher closure rates among union establishments in Britain, see the Addendum. The German evidence is noted below.

Summarizing, we see that on average union effects on productivity are small, that profitability is significantly reduced in union settings, and that investments in physical and intangible capital are also materially lower. The studies on which these findings are based attempt to deal with potential biases stemming from omitted variables and union endogeneity, but they not address mechanisms that might allow unionized establishments to do better than this, even outperform (some) nonunion plants.

3.2 The Employee Involvement/High Performance Work Practice Literature Background

As CAPPELLI/NEUMARK (2001, p 738) note, the literature on work organization and attempts to reform it is vast. Here we offer an eclectic review of the impact of innovative work practices on several measures of firm performance that always has an eye to unions, reflecting the conjecture that participatory systems might work better in union regimes (LEVINE/TYSON, 1990). We preface our summary of the empirical evidence with some cautionary remarks on methodology that arise in this literature and are additional to the classic problem of omitted variable bias encountered in the union literature.

One important preliminary issue is what constitutes high performance work practices. Although different researchers have used different measures (and terminology), there is broad agreement that employee involvement is central to the definition (e.g. APPLEBAUM/BATT, 1994). More concretely, TQM programs, quality circles, functional flexibility, and teamwork are core elements of HPWP. Aiding such practices are individual and organizational supports (the terminology is that of FORTH/MILLWARD, 2004, p 100). Examples of the former are information disclosure, job rotation, and training, while the latter include job security guarantees, internal labour market structuring, and financial participation. Management practices that are difficult to fit into this mould, but are no less central, include benchmarking and computer usage. Despite this agreement, as HANDEL/LEVINE (2004, pp. 14-15) note, measurement problems arise because there is no theoretical guidance on which combination of practices might be more effective and no unambiguous way of measuring the bundles. As we shall see, researchers have used interaction effects, additive indices, factor analysis, and combinations supported by a priori reasoning. A potentially major complicating factor is that survey data may not go beyond identifying the presence of a practice, neglecting its reach, coverage and intensity.

Another important issue that needs to be raised at the outset is the diffusion of high performance work practices. Researchers typically do not have information on when a particular practice was initially introduced and typically do not have information on when it was discontinued. If researchers are observing a situation in cross section that is late in the diffusion of the practice in question, then any pro-productive effect will likely be biased downward. Also, there is a potentially serious loss of information arising from the failure to observe situations in which practices were discontinued. Even if the researcher has information on changes in practice (in either direction), and abstracting from measurement error, the panels are typically too short to accommodate learning effects. The bigger problem is of course that the number of changes in innovative practices in the typical panel is simply too small to take advantage of panel estimation techniques.

The studies we next examine in detail are among the most recent U.S. empirical inquiries of workplace innovations. Since we focus on direct performance measures they do not include work on the relationship between EI/HPWP and earnings (for a review of which see HANDEL/LEVINE, 2004, Table 2). They constitute part of what CAPPELLI/NEUMARK (2001, p. 739) call the 'second wave' of research on organizational performance are very much in the spirit of the wider employee involvement/high performance work practice literature. Table 1 provides the bare bones.

Unionism is almost incidental in the first three studies in the table, and even when a union measure is included in the array of control variables its influence on the outcome indicator is scarcely documented. The leitmotiv of these studies is the attempt to make the best use of longitudinal and cross section data. In the case of the first row entry of Table 1, the goal is indeed methodological: HUSELID/ BECKER (1997) provide a follow-up study of an earlier cross-section analysis by one of the authors (HUSELID, 1995), now using panel data for 1993-96 to control for firm fixed effects while examining the sensitivity of the latter to measurement error.[8]

Huselid and Becker identify no less than 13 'human resource management practices' and consider their impact on two measures of financial performance. Factor analysis is used to construct two factors measuring the extent of use each of the practices. The two factors are termed 'employee skills and organizational structures' and 'employee motivation,' suggesting that they may include constituent elements that others might not consider to be high performance practices (GODARD, 2004, p 354). The control variables comprise capital intensity, employment, union coverage, the R&D sales ratio, and sales growth. The upshot of the authors' analysis is that factors having a statistically significant effect on financial performance in (three out of four) cross section(s) were no longer significant using a fixed effects specification. The story does not end here as Huselid and Becker report sizeable measurement error in the workplace practices. Based on independent estimates of the measurement error (Cronbach's alpha), they argue that the fixed effects estimates become closer to the cross section estimates and in particular that a one standard deviation increase in a unidimensional measure (being the sum of the two dimensions noted above) of high performance work systems increases the market valuation of the corporation by $15,000 per worker. However, as noted by CAPPELLI/NEUMARK (2001, p 741), the problem of measurement error is exacerbated in a short panel of this nature because most firms would have had the work practices in question so that we would expect there to be little difference in their use over the two-year interval in question (the practices were observed in 1991 and again in 1993).

[8] HUSELID (1995) reported that his additive indices of HPWPs were associated with reduced labour turnover, higher sales per employee, and improvements in (one measure of) financial performance among his cross-section sample of 986 firms.

Table 1. Selected U.S. studies examining the effect of employee involvement/high performance work practices on firm performance

Study	Data	Methodology	EI/HWPA measure	Union variable	Findings
1. Huselid and Becker (1997)[a]	1991 sample of 820 publicly-quoted companies with more than 100 employees; and a panel of 218 companies, 1991-93, also used in cross section for 1991 and 1993.	Cross section, fixed effects, and random effects models. Dependent variable: financial performance, measured by Tobin's q and the gross rate of return on assets.	13 high performance work practices. Factor analysis used to identify 2 factors or groupings, and scales constructed for each factor by averaging those questions loading clearly on each respective factor. However, since the effects of a change in the human resource system was found to be the same whether it occurred through a unit change in either factor, the authors subsequently sum the two dimensions.	Union coverage included in the control set, but its effect not separately identified.	Strong effects of human resource strategy (factors and summed factors) on financial performance reported in cross section. Specifically, a one standard deviation increase in the firm's usage of high performance work systems increased Tobin's q by 14% and the accounting rate of return by between 13 and 28%. In the fixed effects specifications, however, the effects were only one-fourth as large and were statistically insignificant throughout. However, correction for measurement error in the panel is claimed to yield impact effects that are in line with the cross-section estimates.
2. Ichniowski, Shaw, and Prennushi (1997)[b]	36 production lines of 17 steel producers. Up to 2,190 monthly observations in the panel.	OLS and fixed effects engineering production functions. Dependent variable: production uptime, namely, the fraction of scheduled operating time that the line actually runs.	Up to 15 individual human resource management variables are identified. Grouped into 4 HRM 'systems' from HRM1 ('traditional') where none of (11) practices were encountered to HRM4 ('innovative') where all practices are found. Identification of grouping is on the basis of inspection, but also supported by/robust to statistical classification procedures. Models include up to 25 controls for detailed features of the line (e.g. line width and speed).	Meetings with unions and union status of the production line.	OLS results show that uptime increases monotonically in degree of HRM innovation. Fixed effect estimates – based on HRM group changers – also indicates this positive hierachical pattern. Estimated productivity effects very similar across specifications. No real indication that individual HRM practices or unionism have an additional (to HRM group) effect on the production measure in either OLS or fixed effect specifications. In short. innovative employment practices are complements.

3. Cappelli, and Neumark (2001)	National Employer Surveys of 1994 and 1997 matched to the 1977 Longitudinal Research Database (LRD) to provide panels for 1977-93 and 1977-96. Number of observations is 443 and 666 respectively. It is assumed that EI/HPWP measures were only introduced some time after 1977 so that their 'levels' observed in 1993 and 1996 can be used in first difference estimates.	OLS regressions for 1993 and 1996 cross sections and for models in first differences. Dependent variables: log sales per worker; log labour costs per worker; log of the inverse of unit labour costs.	11 work practices including benchmarking and computer usage in addition to 'employee involvement mechanisms' (team working and TQM) and supportive measures (job rotation, gain-sharing, etc.) These considered singly and severally in 6 bundles suggested by a priori reasoning.	No union argument is included in the control variables.	The results for productivity indicate a positive association between individual practices and log sales per worker. But statistical significance is weak and the effect is further attenuated in first difference estimates. Some evidence of potential synergies in the bundles but the balance of the main and interactive effects is seldom statistically significant. The results for labour costs suggest that several practices increase costs in roughly similar amounts to the productivity effects. No indications of any efficiency effects (i.e. reductions in unit costs).
4. Cooke (1994)[c]	841manufacturing firms in Michigan, 1989.	OLS cross section estimates. Dependent variable: company performance, defined as value added net of labour cost per employee. Three separate regressions for value-added per employee, average hourly wages, and labour costs as a	Employee participation, as proxied by presence of work teams, and group-based incentives, as measured by existence of profit/gain sharing plans.	Union status of the firm is interacted with team and profit/gain sharing variables. Reference	Union firms are 13% more efficient than nonunion firms. If union firms have teams they are 35% more efficient than the nonunion no-team counterfactual. The corresponding advantage of nonunion firms with team working is actually negative. But the addition of profit/gain sharing has a much bigger relative payoff in nonunion than union firms (18% versus 6.5%). The interaction of teams and profit/gain

		share of labour cost. Firm performance is thus the estimated value added per employee for the relevant EI/HPWP combination less the estimated wage difference adjusted for the labour cost share differential.		category: nonunion firms with neither team working nor profit/gain sharing.	sharing is modest in nonunion firms and negative in union firms. No significance levels of these effects are provided.
5. Black and Lynch (2001)	Educational Quality of the Workforce National Employers Survey (EQW-NES) data for 1994 matched to information from the LRD for 1987-93 (n=638).	Cobb-Douglas production function. Dependent variable: log sales per employee. Cross - section estimates for 1994 plus panel analysis for 1987-93 period. The panel analysis uses within and GMM estimators to first derive average residuals for each establishment. These residuals are then regressed on the EI/HPWP measures and other time-invariant variables from the 1994 EQW-NES (technology, worker characteristics, etc.)	6 variables proxying HPWP (TQM, benchmarking, number of managerial levels, number of employees per supervisor, proportion of workers in self-managed teams, and log number of workers in training); 2 measures of 'employee voice' (unionization, and proportion of worker meeting regularly in groups); and 2 types of profit sharing (for management and for production workers).	Union presence plus interactions with nonmanagerial profit sharing and TQM.	In the cross sections only one HPWP – benchmarking – is statistically significant. No synergies between the HPWPs are detected. Of the other variables, the proportion of workers meeting in groups and profit sharing schemes for production workers often seem to raise productivity. Of the interactions tested, there is a positive association between unionism and profit sharing for production workers. The panel estimators produce basically similar results except that TQM now enters negatively as does the union variable. The latter effect is offset by the union-profit sharing interaction.
6. Black and Lynch (2002)	EQW-NES data for 1994 and 1997. Cross-section sample is 1,443 firms; panel sample comprises 284 firms.	Cobb-Douglas production function estimates in cross section (1996) and first differences (1993-96). Dependent variable: log sales per worker. Parallel wage	Somewhat different mix to Black and Lynch (2001) in row 5. In addition to the proportion of workers in self-managed teams, benchmarking, and the number of managerial levels, the HPWP set also includes 're-	Union presence plus interactions of the union measure with profit sharing, re-engineering,	For the 1996 cross section, of the HPWP measures only the positive effect of profit sharing on productivity is well determined across specifications. The union role, but not the other voice argument is positive and statistically significant. But the union profit sharing interaction term is larger and of

	functions are also estimated for 1996 and 1993-96.	engineering' and profit sharing. Employee voice variables are as before, namely, union presence and the proportion of workers meeting regularly in groups.	and the percentage of workers meeting regularly in groups.	opposite sign. The union re-engineering interaction term is positive and well determined. For the panel estimates, the effect of re-engineering (proportions of workers in self-managed teams) is positive (negative) and well determined. Neither voice argument is statistically significant. No interaction term is statistically significant other than that between union presence and the proportion of workers meeting regularly in groups, which is strongly positive. For their part, the wage regressions show further variation.

Notes: See also HUSELID (1995); See also ICHNIOWSKI (1990); See also COOKE (1992).

The advantage of the study in row 2 of the table is that in examining a single process – steel finishing – within an industry, the problem of output heterogeneity is presumably minimized. And in constructing a long time series, the beginning of which is likely marked by an absence of high performance work practices, the impact of those practices might be better discerned – subject to various caveats on the diffusion of the practices in question. In this study, ICHNIOWSKI/SHAW/ PRENNUSHI (1997) identify 15 human resource management practices that cover incentive pay, recruitment and selection, teamwork, flexible job assignment, employment security, skills training, communication, and labor relations. As noted in the table, these are subsequently grouped into a hierarchy of four distinct human resource management systems. The delineation is on the basis of a priori reasoning, supported by several statistical procedures. The hallmark of this study is, then, a hypothesized complementarity of workplace practices. The workplace practices are accompanied by detailed controls (among the time-varying regressors included in the fixed effects specifications are age of line, start-up periods, the quality of steel input, and the introduction of new equipment). The dependent variable is product uptime.

It is reported that the more innovative human resource systems that significantly increase line uptime in cross section have similar effects when controlling for permanent unobserved line heterogeneity, unlike the study by Huselid and Becker in row 1 of the table. Consistent with that study, however, is the finding of complementarity in employment practices. Individual practices have little or no incremental effect on productivity. That is to say, when individual practices are added to regressions containing the HRM systems of practices, they have little additional effect on productivity; and in comparing these (OLS and fixed effects) regressions with ones containing only the individual practices, the typically well determined estimates for the latter (including in one specification a negative effect of unionism) effectively vanish with the addition of the system effects. ICHNIOWSKI/SHAW/PRENNUSHI (1997, p 311) conclude that "systems of HRM practices determine productivity … while marginal changes in individual practices have little effect." That said, there are some lingering ambiguities in the study stemming from the collinearity among practices, and no discussion of whether all practices in the round contributed independently of the other bundles (Godard, 2004, p 355).

The study by CAPPELLI/NEUMARK (2001) in row 3 of the table uses information on working practices from a nationally representative sample of establishments based on two surveys (the National Employers Surveys for 1994 and 1997) with a high response rate. These establishments are matched to LRD data to obtain information on their performance, productive inputs, and other characteristics. Another distinguishing characteristic of the study is its use of multiple outcome indicators, the goal being to determine whether increases in productivity translate into improved performance by lowering unit costs.

To all intents and purposes, the high performance work practices are only observed at one point in time – strictly speaking the practices are observed in two years but five such practices are unique to the 1994 survey while six are asked of both surveys – but a long panel(s) is constructed by matching establishments in the cross section data to the 1977 LRD. Here the assumption is that the innovative work practices did not exist in 1997, so that the innovative practices in levels can be used in fixed effect specifications as all observations necessarily represent changes. The authors present results for two panels, 1977-93 and 1977-96, as well as for two cross sections, 1993 and 1996.

As in the row 1 and 2 studies, CAPPELLI/NEUMARK also look for synergies in innovative work practices. They first enter the practices individually and then in groupings suggested by design (e.g., teamwork training is designed to improve performance in teams and should be more productive with employee meetings and self-managed teams) or prior research. As shown in the table, the results are mixed, pointing to few synergies and much evidence of heterogeneity bias in cross section. In terms of the three outcome indicators, the main results are that high performance work practices raise labour costs per worker, that they may raise productivity (sales per employee), and that they have no effects on unit labour costs. The last result may mean that, at a pinch, productivity and labour costs may be offsetting.

The study in row 4 of the table is notable for being the first to do more than simply include a union variable in the control set. COOKE (1994) examines whether unionism positively or negatively influences the effectiveness of employee-participation programs and group-based incentives in his sample of Michigan manufacturing firms. Cooke's measure of performance is value added net of labour cost per employee. To calculate this magnitude he estimates three equations: value added per employee, wage rates, and labour cost/total cost. That is to say, he subtracts the estimated wage differential, adjusted by the labour cost share differential, from the estimated value added per employee differential to derive the performance measure.

His measure of employee involvement is a dummy variable indicating the presence or otherwise of team working, and his group incentives variable is another dichotomous variable capturing the presence or otherwise of either profit-sharing or gainsharing plans. These dichotomous variables are separately and jointly interacted with the union status of the firm; the omitted category being the compound 'nonunion/no gainsharing/no group incentive pay.' The other regressors include firm size, depreciable assets per employee (albeit only at the firm's 2-digit primary industry, so that the same capital intensity is assigned to union and nonunion workplaces alike), and proxies for the skill composition of the workforce, technology, and market power.

Using the estimated differentials associated with each combination of employee involvement, group incentive pay, and union status, Cooke estimates their performance effects. The basic result is that unions elevate pay less than they increase productivity. Alone among the studies, Cooke reports that firm performance is 13 percent higher in unionized plants without either employee involvement or incentive pay than in comparable nonunion firms. The introduction of team working raises this differential to around 35 percent. By contrast, its introduction in the nonunion sector does not improve the innovating (nonunion) firm's net performance. In the absence of teamwork, group incentive pay has a much larger effect on efficiency in nonunion firms (+18.5 percent) than in union firms (+6.5 percent). In combination, the two measures also have a much bigger performance payoff in nonunion (+21 percent) than union (-0.7 percent) firms. While suggesting that the payoff to employee involvement and incentive pay may sharply differ in union and nonunion regimes, this study clearly paints a much rosier picture of union

impact than the material reviewed earlier. Unfortunately, we are not told the statistical significance of the effects on performance. The cross section nature of the study, the deficiencies of the capital measure, and issues of representativeness are additional sources of concern.

The study in row 5 of the table attempts to deal with each concern. BLACK/ LYNCH (2001) estimate production functions for a large, nationally representative sample of manufacturing establishments. The authors fit augmented Cobb-Douglas production functions to both cross section and panel data for 1987-93, having much richer data than Cooke.[9] The authors identify six high performance work systems (TQM, benchmarking, number of managerial levels, number of employees per supervisor, the proportion of workers in self-managed teams, and the {log} number of employees in training), two employee voice measures (unionization and the proportion of employees meeting regularly in groups), and two types of profit sharing (for management/ supervisors and production/clerical/technical). Panel techniques are used in an attempt to tackle a potential omitted variables problem due to unobserved establishment characteristics (but see below). Specifically, Black and Lynch use a two stage procedure that involves first estimating a fixed, time-invariant firm effect for each establishment using data for the time-varying factors – namely, capital, labour, and raw materials – and then regressing these fixed effects (or firm-level efficiency parameters) on all the time-invariant factors.[10]

The cross-sectional estimates indicate that, although most of the high performance work practices are positively associated with labour productivity, only benchmarking is statistically significant at conventional levels. Of the separate voice and profit sharing arguments the proportion of workers meeting regularly in groups – although not unionization – and nonmanagerial profit sharing are positively and significantly associated with productivity in most specifications. Contrary to the studies in the first two rows of Table 1, Black and Lynch report that there is no evidence of a synergistic bundling of the high performance work systems, although there is a positive and statistically significant association between unionization and nonmanagerial profit sharing.[11] Finally, the results for the panel data second-step estimation are much the same as the cross-sectional results, although in the specification containing interaction terms the own effect of unionism becomes negative, much larger in absolute magnitude, and marginally statistically significant (even if this effect is more than counteracted by the positive interaction between unionism and nonmanagerial profit sharing).

Black and Lynch use their estimates to show how unionized establishments that embrace what are termed "transformed" industrial relations practices can have higher productivity than nonunion plants. Specifically, a hypothetical union plant practicing benchmarking and total quality management, with 50 percent of its workers meeting on a regular basis, and operating profit sharing for its nonmanagerial employees is reported to have 13.5 percent

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[9] For example, their capital stock measure is constructed from information on the book value of assets in the base year (1987) and new investments in each year, net of an estimate of the fraction of capital that is used up each year.

[10] In addition to the within estimator, the authors use a GMM estimator in the first step to deal with biases stemming from the endogeneity of capital, labour, and materials.

[11] The authors note that, although individually only one interaction term was statistically significant, they rejected at the .05 level the joint null that all four interactions were zero.

higher labour productivity than a nonunion plant with none of these practices. By contrast, the corresponding differential for a high performance nonunion establishment is just 4.5 percent. In contrast to the row 4 study, however, if union and nonunion plants possess none of these workplace practices, the nonunion establishments have 10 percent higher labour productivity than their union counterparts. Note there is no attempt in this study to discover whether the workplace practices in question are positively related to average costs per worker (for evidence of which, see CAPPELLI/NEUMARK, 2001, in row 3).

BLACK/LYNCH (2001, p 443) themselves note that, despite the use of panel methods, the regressors used in the second stage procedure referred to earlier may still be correlated with unobserved time-invariant plant-level characteristics, thereby biasing the coefficient estimates on high performance workplace practices. One such variable is of course managerial quality. If more able managers are found in establishments that have greater recourse to such practices then the effects attributed to them may simply reflect good management. In the last row entry of Table 1, in their new study BLACK/LYNCH (2000) present results from using a second wave of the dataset containing information on work practices and estimate a model in first differences, 1993-96 (as well in cross section for 1996). As can be seen from the table, compared with the row 5 study there is some redefinition of high performance work systems, including the use of a new variable 'reengineering.' Another change is that unionization is now interacted with four of the work practices, including the proportion of workers meeting regularly in groups.

The results differ somewhat from BLACK/LYNCH (2001). Commenting here on just the fixed effects findings, we see that reengineering is the only work practice with a statistically significant pro-productive own effect. For its part, the own effect of unionization is poorly determined throughout, although when interacted with the worker meeting variable the effect is positive and statistically significant. The own effect of worker meetings is strongly negative.

A final study not included in Table 1 nevertheless merits attention because it addresses the vexed issue of contingency in a union and high performance work practice context. The setting is the course of productivity at a single commercial aircraft manufacturer, 1974-91. During the sample period there were three strikes and one work to rule, one major production change, three (five) changes in top management (union presidents), and the introduction of a TQM program towards the end of the sample period that included high levels of employee involvement and formal assurances of job security. KLEINER/LEONARD/PILARSKI (2002) provide a detailed history of these industrial relations developments based on interviews with production managers and union leaders, and estimate an engineering production function to investigate the effect of these changes. As expected, withdrawals of labour are associated with reduced productivity; also as expected, it only takes between one to four months to return to pre-strike productivity. Union leadership also seems important, while productivity appears highest when hawks on both sides negotiate. The effects of TQM are if anything perverse, which result is held to reflect the manner of its introduction ("a top-down process that never fully won the

embrace of the line workers or their front-line supervisors") (KLEINER/LEONARD /PILARSKI, 2002, p 203). It is argued that TQM was bearing fruit at exactly the time management's patience ran out (although the shift back to an authoritarian structure produced improved results in the short run). No less interesting, the authors observe that the effects of TQM may be upwardly biased because they fail to account for the impact of firms that are unsuccessful in implementing it – an inference that might be generalized to other practices pending improved datasets containing information on EI/HPWP dissolutions as well as adoptions.

The results of the more recent U.S. literature on innovative work practices are, then, decidedly mixed both as regards the impact of particular practices and synergies between them. Abstracting from causation issues, positive effects on productivity where observed are only one-half the story, impact on the bottom line is the other. Contingencies may also cast a long shadow in reaching a judgment on the role of such practices. This setting is not altogether propitious for assessing the contribution of the union institution, and it is unsurprising that the mainstream EI/HPWP literature has practised benign neglect here. Yet recent U.S. evidence does point to some positive interaction effects between individual work practices and unionism. Indeed, even though the nature of some of the associations is at times opaque, it has sometimes been claimed that there is a hierarchy for productivity performance with unionized plants having innovative practices at the top – above those of nonunionized plants with the same set of practices – and at the bottom in traditional workplaces. This conclusion and the use of synthetic workplaces to identify hierarchies are premature but the literature has demonstrated potential offsets to the union wage differential.

4. German Evidence

Reflecting the facts of workplace representation, most German studies have focused on the impact of works councils rather than unions, although interest in the union role – strictly, the collective agreement external to the establishment – has increased in the wake of FREEMAN/LAZEAR'S (1995) extension of the voice model.[12]

4.1 Works Councils and Establishment Performance

In a reversal of the pattern of the U.S. literature on worker representation, the early German literature pointed to mostly negative effects of works councils on firm performance. These studies cover a wide range of performance outcomes – total factor productivity, profits, product innovation and R&D, investment in physical capital and

[12] Indeed, since this chapter was written, there has been a mini-explosion of interest in the effect of German collective bargaining proper on wages. See, inter al., ADDISON/TEIXEIRA/ZWICK (2006); GERLACH/STEPHAN (2005, 2006); GÜRTZGEN (2005, 2006); FITZENBERGER/ KOHN/LEMBCKE (2008).

(excessive) quits – do not lack rigor,[13] and contain detailed information on establishment characteristics and sometimes union density (on the interaction of union density and works councils, see FITZROY/KRAFT, 1990; SCHNABEL/WAGNER, 1994). But they have the disadvantage of small sample size – typically around 100 firms/plants – raising obvious issues of external validity.

More recently, analysts have been able to work with much larger data sets, namely, the Hannover Firm Panel, the NIFA-Panel, and the nationally representative Establishment Panel of the Institute for Labour Market Research, or IAB Establishment Panel. The Hannover Panel is a stratified random sample of all manufacturing plants with at least five employees in the German state of Lower Saxony, 1994-97. It comprises around 1,000 establishments in 1994, declining to a little over 700 establishments in 1997 because of sample attrition. The NIFA-Panel is a survey of all establishments in the German machine-tool industry, 1991-98. The sample base is around 6,000 firms and the realized sample approximates 1,500 per wave. Finally, the IAB Establishment Panel has been conducted each year from 1993 (for eastern Germany from 1996 onward). It is based on a stratified random sample – strata for 16 industries and 10 size classes – from the population of all establishments with at least one employee covered by social insurance. The panel is created to serve the needs of the Federal Labour Agency, and so its focus is on employment-related matters. The two other surveys contain somewhat richer establishment information, and, in the case of (one wave of) the NIFA-Panel, subjective data on works council 'type' and 'degree of works council involvement' from a management perspective (see DILGER, 2002). That said, the IAB Establishment Panel contains the only nationally representative longitudinal sample of establishments and unlike the other two data sets it is possible to proxy the capital stock.[14]

Table 2 reports results from a selection of studies using two of the new data sets. It is not meant to be fully inclusive of the literature for two reasons. First of all, it is deliberately 'light' on the more descriptive labour turnover literature.[15] Second of all, it is only one-half the research that we review: Table 4 contains studies that also consider EI/HPWP (to include training).

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[13] Among the best examples are the papers by FITZROY/KRAFT (1985, 1987, and 1990) that deploy systems of equations in examining profitability, total factor productivity, and innovation, respectively, in a small sample of a little over 60 metal working firms. The unifying theme of all three papers is a managerial pressure/managerial competence model: efficient managers are able to elicit greater effort from their workforces without interference from works councils and are also able to institute adequate systems of communication and decision-making and avoid (the delays associated with) works councils, partly by paying higher wages. As can be seen in Table 4, below, this model is qualified in a more recent study by the authors (FITZROY/KRAFT, 1995).

[14] Most recently, analysts have used data from the IAB Linked Employer-Employee Data set (LIAB), combining data from the IAB Establishment Panel and the Employment Statistics Register (e.g. ADDISON/TEIXEIRA/ZWICK, 2006)

[15] But for an interesting study of quits, hires, and labour fluctuation using the NIFA-Panel that exploits works council type, see DILGER (2002).

The most notable feature of the studies using these large datasets is their more favourable evaluation of works council impact. For the two studies using the Hannover Firm Panel (rows 1 and 2 of the table), the pro-productive effect of the works council depends on establishment size and collective bargaining regime, respectively. ADDISON/SCHNABEL /WAGNER (2001) report that works council presence is associated with higher value-added per employee only for the all-firm sample; for smaller establishments with between 21 and 100 employees the association is statistically insignificant. This result might reflect a theme of the earlier literature to the effect that for smaller firms the advantages of codetermination may be lower and the costs higher than for larger firms. But the authors' own justification for focusing on this sub-sample is two-fold: first, lacking information on works council type, it makes sense to estimate the effect of the entity for a sample in which the rights/powers of the works council are a datum; second, only in this employment range are establishments with and without works councils present in reasonable numbers, as opposed to being dominant (see above). Apart from there being no evidence of higher productivity within this sample, Addison, Schnabel, and Wagner also report that works councils are not associated with reduced labour turnover in this sub-sample either, although they obtain the conventional effect for the all-establishment sample.

For their part, HÜBLER/JIRJAHN (row 2) emphasize not establishment size but instead whether or not the establishment is covered by a collective agreement. They seek to test the argument of FREEMAN/LAZEAR (1995) that where a works council is embedded in a (external) collective bargaining arrangement, the control exerted by the union and the employers' federation can serve to dissipate distributional squabbles at the workplace allowing the voice effects to realized. As can be seen, they report that pro-productive works council effects are only found where the establishment follows a collective agreement.

Table 2. Recent estimates of the effects of works councils on performance.

Study	Data	Dependent Variable	Methodology	Works council measure/controls	Findings
1. Addison, Schnabel, and Wagner (2001)	Hannover Firm Panel. 900 establishments from the 1994 wave.	Value added per worker; subjective measures of financial performance; wages and salaries per employee (and the percentage 'wage gap'); three labour turnover measures (hires, separations and gross turnover); and two innovation measures (introduction of new processes/products).	Single equation estimates. Separate results for all - establishment sample and subset of plants with 21-100 employees.	Works council presence. Controls include establishment size/age; measures of workforce composition and skill; product market competition; capacity utilization; profit sharing; state of technology; 'excessive' wage costs; and industry dummies.	Works council presence is associated with higher productivity overall but not for plants with 21-100 employees. Profitability systematically lower in works council regimes. Wages higher in the presence of works councils, but sources of these higher earnings are not transparent. All labour turnover measures are reduced in works council settings, other than for the subset of smaller establishments. Innovation measure unaffected by works control presence.
2. Hübler and Jirjahn (2003)	Hannover Firm Panel. Pooled data from the 1994 and 1996 waves.	Value-added per employee and wages and salaries per employee.	Bivariate probit maximum likelihood estimates of works council presence and coverage by collective agreement to form selection arguments in wage and productivity equations.	Works council presence and coverage by a collective agreement. Controls include establishment age/size/legal status; product market competition; measures of workforce composition and skill; profit sharing; state of technology; team work; and industry dummies.	In separate productivity regressions by collective bargaining status, the positive effect of works councils on performance is statistically significant only where the plant is covered by a collective agreement. Wages are higher under both collective bargaining regimes, although the effect is better determined where there is no collective agreement.

3. Frick and Möller (2003)	IAB Establishment Panel. Cross sections for 1998 and 2000.	Log value added.	OLS estimation of Cobb-Douglas, CES, and translog production functions. Separate estimates for West and East Germany; summary results for manufacturing and services.	Works council presence. In addition to log capital (proxied by replacement investment) and log employment, the regressors comprise: profit sharing for employees; process innovation; product innovation; employment of apprentices; coverage by a collective agreement; percentage of qualified employees; percentage of sales exported; and 14 sector dummies.	Plants with works councils have sharply higher productivity of 25% (30%) in West (East) Germany. Disaggregation by sector confirms results other than for West German manufacturing in both 1998 and 2000. Works council interaction with profit-sharing is statistically insignificant.
4. Schank, Schnabel, and Wagner (2004)	IAB Establishment Panel, 1993-2000. Unbalanced and balanced panels of plants with 21-100 employees.	Log sales	Fixed effects stochastic frontier production function estimated separately for plants with and without works councils and for balanced and unbalanced panels. The comparison is between the technical efficiency estimates – and the 95% confidence intervals – of the median works council plant and its non-works council counterpart.	Works council presence. Regressors include log employment; shares of part-time, skilled, and female employees; 41 sector dummies; and 7 year dummies.	There are no statistically significant differences in efficiency between establishments with and without works councils. Results robust to disaggregation by broad sector and to time interval (use of two different five-year balanced panels).
5. Addison, Bellmann, Schnabel, and Wagner (2004)	IAB Establishment Panel. Initial sample of 1,544 establishments	Changes in quits, sales per employee, employment, and the profit-situation.	Nonparametric propensity score matching model. 'Treated' group comprises all plants in which a works council was set up between 1996 and 1998.	Introduction of a works council.	Mean values for the performance indicators in establishments that experienced the formation of a works council are not statistically different from those obtaining in plants that remained free of works

	all without works councils in 1996.		Matched plants derived from 1,513 controls.		councils. Results are robust to outliers.
6. Addison, Bellmann, and Kölling (2004)	IAB Establishment Panel, 1996-2000.	Plant closings.	Probit estimates for the following samples: all-plants; plants stratified by whether or not they are covered by a collective agreement; plants stratified by size (less than or more that 50 employees); and plants stratified by both collective agreement and size.	Works council presence. Apart from coverage by a collective agreement and establishment size, the covariates include plant age; workforce composition and skills; recent layoff experience; state of technology; regional unemployment rate; and industry dummies.	For the aggregate sample, works councils associated with significantly higher closings. Works council effect is sharper for the uncovered sector and for smaller plants but the difference is not statistically significant. Only for small plants that are covered by a collective agreement is there any suggestion that collective bargaining coverage can lower closure rate.

The Hannover Firm Panel does not contain information on the capital stock, raising the potential problem of omitted variables bias. However, the capital stock may be inferred from data on replacement investment in the IAB Establishment Panel. Using this information, the study by FRICK (2003) in row 3 of the table provides one of the first estimates of a works-council-augmented production function for Germany (see also ADDISON/KRAFT/WAGNER, 1993; FITZROY /KRAFT, 1987). The magnitude of the works council 'effect' is highly reminiscent of the union effects reported by BROWN/MEDOFF (1978) some 25 years earlier for the United States. Plants with works councils have 25-30 percent higher productivity than their counterparts without works councils. Drawing on secondary evidence that wages are higher in works council plants, FRICK (2003, p 448) nevertheless cautions that these effects may not compensate firms for the additional costs.[16]

The next two studies summarized in Table 2 that also use the IAB Establishment Panel question this large productivity effect of works councils (as indirectly does the final study in row 6). Substituting sales for value added on data grounds – for example, respondents often fail to answer the materials cost question in the panel survey[17] – and restricting the sample to plants with between 21 and 100 employees, SCHANK/SCHNABEL/WAGNER (2004) estimate frontier productions for separate samples of firms with and without works councils, 1993-2000. They report no statistically significant differences in the technical efficiencies of the median plant in the two samples. Using a very different approach, the study by ADDISON/BELLMANN/SCHNABEL/WAGNER (2004) in row 5 of the table seeks to carefully match plants that witnessed the formation of works councils in 1998 and those that remained free of works councils for the entire sample period (1996-2000). For their four outcome indicators, including a proxy for productivity growth, they report no statistically significant differences in mean performance among the two types of firms. This study represents one attempt to deal with selection problems that dog the other estimates in Table 2.

The final study in row 6 of the table is relevant from the perspective of another type of potential bias attaching to both cross section and (balanced) panel estimates alike, namely, the problem that we are observing survivors. Underperforming works council plants may have been evolved out of the system, leaving an unrepresentative sample of survivors. The study by ADDISON/BELLMANN/KÖLLING (2004) does find that other things being equal works council firms do fail at higher rates than their non-works council counterparts. Although this hints at survival bias, we would caution that this evidence is indirect (i.e., survivability should be modelled simultaneously with the performance equation), that the failure rates in question are low, and that the number of industry controls is for statistical reasons quite limited.

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16 Most German studies report that the simple association between works councils and wages is positive and statistically significant. But there is the suggestion that the excess of wages over those agreed to in collective agreements does not point in the same direction (see ADDISON/SCHNABEL/WAGNER, 2001). Investigation of the works council-pay nexus is currently the subject of considerable research interest.

17 No less important, the materials costs – measured as the percentage share of sales represented by materials costs – often seem to be little more than informed guesses.

Table 3. Works council coefficient estimates from a translog production function fitted to IAB establishment panel data, 1997-2000

		Sector	
Sample	All	Manufacturing	Services
Firms with 21-100 employees			
Pooled	0.118***	0.046	0.183***
	(3.22)	(1.03)	(3.05)
1997	0.123*	0.119*	0.098
	(1.86)	(1.73)	(0.82)
1998	0.107*	0.063	0.145
	(1.94)	(0.94)	(0.61)
1999	0.056	-0.011	0.139*
	(1.16)	(0.18)	(1.72)
2000	0.172***	0.070	0.269***
	(3.60)	(1.22)	(3.41)
Firms with ≥5 employees			
Pooled	0.232**	0.177***	0.275***
	(8.88)	(5.71)	(3.05)

Source: ADDISON/SCHANK/SCHNABEL/WAGNER (2003)

Notes: The dependent variable is log total sales. In addition to the log capital stock, log number of employees, and works council presence, the regressors are: investment in ICT, state of technology, workforce composition (share of part timers, apprentices, and skilled workers), coverage by a collective agreement, a dummy for eastern Germany and, for the relevant pooled/cross section regressions, sector and/or year dummies

$|t|$ - values in parentheses

***, * denote significance at the .01 and .10 levels, respectively.

By the same token, one should continue to be wary of the ambitious pro-productive works council effects provided in row 3 of the table. In Table 3, we present summary results from fitting a translog production function to pooled data for 1997-2000 from the IAB Establishment Panel. The dependent variable is sales (rather than value added) and the sample is restricted to firms with 21-100 employees, other than in the last row of the table where pooled estimates for the entire sample of establishments with five or more employees are provided for purposes of comparison. Although works council 'effects' are in our view still uncomfortably large,[18] note first the differences between the coefficient

[18] Quantile regression analysis suggests that the large pro-productive effects for the all-establishment sample in the Hannover Firm Panel are driven by highly productive plants; that is, they are detected only in plants at the top end of

estimates in the pooled regressions for the sample comprising plants of all sizes and the sub-sample of establishments with 21-100 employees. Next observe the generally insignificant coefficients for the all-important German manufacturing sector in both pooled and cross-section data. Then observe the variation in the coefficient estimates in cross section. Finally consider that there are no a priori grounds for expecting major differences in works council effects as between manufacturing and services. Taken in conjunction with the evidence in Table 2, we would argue that although the early German literature most likely encouraged an overly negative view of works council operation some of the more recent estimates are likely to do exactly the opposite.

4.2 EI / HPWP, Works Councils and Firm Performance

As with the U.S. evidence on unions, however, the issue of works council impact does not end here. Rather more than in the United States perhaps, discussion of the effects of worker representation in Germany has become linked with those of innovative work practices. Table 4 provides a summary of the diverse literature. The themes of this literature, mostly based on the three large-scale datasets introduced earlier, include works council type, incentivization issues, complementarities, and training. Together the studies point to circumstances in which works councils may be associated with favourable productivity outcomes.

We begin with the study by FRICK (2002) (row 1) which, although descriptive, is notable for its attempts to investigate directly the impact of works council type (see also DILGER, 2002). The only large-scale data set to contain such information is the (sixth wave of the) NIFA-Panel. As can be seen, Frick's results using this information are mixed. Thus, HPWPs are not significantly more numerous in works council plants than others and while 'more involved' councils tend to have more HPWPs those works councils dubbed 'antagonistic' by management have the most. Similarly, while HPWPs are reported in the author's multiple classification analysis to benefit firm performance, they are also said to be associated with reduced labour demand.

Unlike the other studies reviewed in Table 4, the analysis in row 2 is based on an early sample of just 65 metal working firms. This dataset was first used by FITZROY/KRAFT (1985, 1987, and 1990) in a series of studies charting the impact of works councils on profitability, total factor productivity, and innovation. Adverse works council effects were reported for all outcome indicators in systems of equations that typically endogenized works council presence. But FITZROY/KRAFT (1995) report that works council effects on labour productivity are actually positive and statistically significant in regimes practicing profit sharing, even if they are negative and well determined in other regimes. The authors attribute the positive works council effect to cooperative labour relations.

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the conditional productivity distribution (see ADDISON/SCHANK/SCHNABEL/WAGNER, 2006). The suggestion may be that only highly competent managers can cooperate with a works council in a way that materially advances productivity.

Table 4. Selected German studies examining the effect of innovative work practices and works councils on performance

Study	Data	Methodology	EI/HPWP measure	Works council variable	Findings
1. Frick (2002	1,700 establishments from the sixth wave of the NIFA-Panel. Dataset identifies five types of HPWP, as well as five types of works council and a measure of works council involvement.	Descriptive analysis of HPWPs by works council presence, involvement, and type. Multiple classification analysis for same categories as in descriptive treatment and five covariates (number of employees, sales per-employee, stock of orders, and capacity/manpower utilization).	The five measures are: reduction in hierarchies; delegation of decision making; work groups with independent budgets; group or team work; flexible working time.	Five works council types range from 'antagonistic' to 'excluded.' The measure of works council involvement signifies greater engagement of works council in processes of technological or organizational change than laid down under law or by collective agreements.	Plants with works councils use more HPWPs than do plants without works councils, but difference is not statistically significant. Plants with more involved works councils have more HPWPs than their less involved counterparts. But the number of HPWPs is highest in circumstances where works council is rated 'antagonistic.' HPWPs are reported to have a positive effect on establishment performance but a negative effect on labour demand.[a]
2. FitzRoy and Kraft (1995)	Pooled data for 1977 and 1979 for 65 metal working firms in West Germany.	Value added production function estimated separately for profit-sharing firms and non profit-sharing firms, with correction for selection into profit sharing status. Also estimation of full interaction equation for the whole sample.	Profit sharing for the workforce.	Presence of works council.	The effect of works councils on productivity measure is negative and statistically significant in non-sharing firms but is positive and statistically significant in profit-sharing firms. Interaction effect between works councils and profit-sharing in full interaction equation is statistically insignificant.

3. Jirjahn (2003)	Pooled data from the 1994 and 1996 waves of the Hannover Firm Panel.	Single-equation OLS pooled productivity estimates. Dependent variable: value added per employee. Auxiliary probit model of works council presence provided but not used to instrument works council presence. Separate estimates for all plants and subset of plants with 21-100 employees.	Managerial profit sharing. Some innovative practices are also included in the probit equation (e.g. further training and flexible working hours) but not in the productivity equation.	Works council presence.	Executive profit sharing schemes are productive for both samples. The interaction between executive profit sharing schemes and works council presence is negative and statistically significant for the all-establishment sample. Works council effect is positive and statistically significant throughout.
4. Wolf and Zwick (2002)	IAB Establishment Panel, for a 1999 cross section and a 1996-99 panel.	Cobb-Douglas production function with capital approximated by replacement investments. Dependent variable: value added and average value added. Cross-section estimates with and without correction for endogeniety of HPWP. For the panel, the estimation follows the Black-Lynch (2001) two-step procedure (see Table 1, row entry 5), with the second stage also controlling for the endogeneity of HPWPs.	Six HPWPs: shifting of responsibilities to lower level in hierarchy; team work; work groups with independent budgets; employee share ownership; profit sharing; training to support organizational change; and incentive training. These HPWPs are aggregated into two independent factors (‘organizational change’ and ‘incentives’) using principal components factor analysis.	Works council presence	In cross section, the positive effect of ‘incentives’ (share ownership, profit sharing, supportive training, and incentive training) results from their being introduced by firms when they are prospering. In the panel (second- step) estimates and after correcting for selection, ‘organizational changes’ (shifting responsibilities, team work, and independent work groups) have significantly positive effect on productivity and are also introduced to deal with structural problems – structural productivity gaps. No interaction between ‘incentives’ and ‘organizational changes.’ Separate works council effect not robust in cross section, but in panel estimates work council presence has significantly positive impact on the establishment-specific fixed effect.

5. Zwick (2003)	IAB Establishment Panel, 1997-2000.	Cobb-Douglas production analysis function. Dependent variable: value-added and average value-added. In other words, the same two-step procedure used by Wolf and Zwick (2002) but with GMM (GMM-SYS) estimator rather than within estimator alone to estimate the production function and the time-invariant establishment fixed effect.	'Participative work forms' based on delegation of responsibility and decision making to lower-levels in the hierarchy, team work, and work groups with independent budgets. These three measures are aggregated to form a single participation variable set equal to one if at least one of the three measures had been introduced by 1997. Participation is endogenized using instrumental variable regressions.	Works council presence, and estimated works council presence in a switching regression model.	After accounting for the endogeneity of participative work forms, the productivity effect of such practices is around 25 percent. In the switching regression, (the instrumented value for) participation is only (marginally) statistically significant in the sample of works council firms. Selection into works council status is well determined in both equations.
6. Zwick (2002)	IAB Establishment Panel. Cross sections for 1998 and 1999 and panel data for 1997-99.	Cobb-Douglas production function approach. Dependent variable: value added. Cross-section estimates of effect of continuous training in 1997 on labour productivity levels in 1998 and 1999. Selection into training status handled through a probit regression used to calculate the probability that a firm offers training and a Tobit equation to predict the	Training incidence (i.e. presence); training intensity (number of trainees divided by number of employees); and training type (formal external courses, formal internal courses, training on the job, seminars and talks, job rotation, self-induced learning, and quality circles).	Works council presence.	In cross section, (lagged) effects of training intensity – actual and predicted – are positively associated with labour productivity. Formal external training courses also positive and statistically significant throughout. Negative effect of training on-the-job. Selection term is negative. Panel estimates indicate that training intensity, formal external and internal courses, and self-induced learning have a positive and significant effect on productivity; after selection is accounted for,

	intensity of training.[b] Fixed effects panel estimation using two-step procedure as in row 4 and 5 studies, also with and without selectivity correction.	the coefficient estimates for training intensity and formal training courses increase in size. Coefficient estimate for the works council dummy is positive and statistically significant in cross-section estimates but not in second-step regression estimates.

Notes: See also ADDISON/TEIXEIRA (2004); See also GERLACH/JIRJAHN (2001).

FitzRoy and Kraft find that profit sharing is associated with sharply higher productivity – in both single and simultaneous equation treatments. This result is not generally found in the large-scale data sets; for example, neither FRICK (2002) (row 3, Table 2), using the IAB Establishment Panel, nor HÜBLER/JIRJAHN (2003) (see row 2, Table 2), using the Hannover Firm Panel, observe discern this outcome.[19] Abstracting from measurement issues (on which more below), an interesting extension of the incentives discussion is profit sharing for executives. The study by Jirjahn in row 3 of Table 4 finds that managerial profit sharing strongly improves productivity, suggesting that it attenuates agency problems. But this issue is only part of the story; the other is works council presence and its interaction with executive profit sharing. As can be seen from the table, the coefficient estimate for works council presence is positive and statistically significant while that for the interaction term is negative and again well determined. Focusing on the latter result, Jirjahn argues it is consistent with two hypotheses: either profit sharing reduces the commitment value of agency in circumstances where works councils cannot foster trust and loyalty absent the cooperation of management, or management rent seeking is curbed by profit sharing and the works council is not important for building cooperation in situations of reduced opportunism on the part of management. Although these empirical findings have yet to be replicated in other data sets, central to Jirjahn's approach is the notion that the management environment of the firm matters in evaluating works council impact. His approach is also very much in the spirit of collective voice model, even if the contribution of the works council is not transparent. This latter remark in turn reflects some negative correlations noted in the literature such as that between team work and works councils, and most of all the simple fact that the magnitude of the negative interaction term between works councils and executive profit sharing exceeds that of the positive point estimate for works council presence.

The remaining three studies in Table 4 follow a common methodology suggested in part by BLACK/LYNCH (2001) (see row 5, Table 1) and use the IAB Establishment Panel. Especial emphasis is placed upon on selection issues and unobserved plant heterogeneity. The study by Wolf and Zwick (2002) in row 4 of the table provides the template for the other two studies. Wolf and Zwick focus on the productivity of HPWPs. They identify seven such practices, which are reduced to two independent factors – termed "organizational changes" (participatory practices such as team work) and 'incentives' (e.g., profit sharing) – using principal components analysis. The authors fit an augmented Cobb-Douglas production function to cross-section data for 1999, including a selectivity-adjusted specification. They also fit a Cobb Douglas function to data for 1996-99 using panel estimation methods, and derive a fixed time invariant establishment-specific effect for each plant after Black and Lynch, which values are then regressed on the time invariant covariates – including organizational changes and incentives – again allowing for

[19] The exception is that the latter do find a positive effect of profit sharing on labour productivity for the uncovered sector which they speculate reflects *union* opposition to profit sharing.

selection. Note that the dataset only enables the authors to identify whether or not the innovative practices were present at a point in time, not when they had been introduced.

As shown in Table 4, both selection and accounting for structural differences matter. The positive effect on productivity of incentive mechanisms, observed in both cross section and in the panel, seem to result from such schemes being introduced in times of plenty, when firms are doing well. That is, after correction for the endogeneity of such measures, the variable is no longer statistically insignificant. For their part, the effect of organizational changes is statistically insignificant in cross section, with and without correction for selection. However, the coefficient estimate is both positive and well determined in the panel estimates, and after controlling for selection strengthens somewhat. The main message of this study, therefore, is that firms which introduce organizational changes seemingly have unobserved time invariant characteristics that decrease their productivity. Expressed differently, participatory work practices raise productivity.

The results pertaining to incentive mechanisms clearly qualify the results of FITZROY/KRAFT (1995) (row 2 of Table 4) who control for the endogeneity of profit sharing but not unobserved firm heterogeneity. Wolf and Zwick nevertheless do argue that works councils work – the coefficient estimate for the variable is positive and statistically significant in the second step panel procedure – even if they do not seem to influence organizational change. Finally, two other results from the cross section part of this study might be noted. Not only is there no evidence of synergies between the two sets of innovative practices but also very few instances of complementarities between their components.

The role of the work council is secondary in Wolf and Zwick. In the next study in the table, it shares equal billing with innovative work practices. ZWICK (2003) (row 5) considers just those practices found to be statistically significant in Wolf and Zwick – namely, organizational changes, now termed 'participation' – and considers their impact on productivity over the same interval, albeit using a different panel estimator for the (first stage) production function and now controlling for the endogeneity of works council presence (as well as that of the participation variable). Other differences reside in the measurement of capital and the construction of the participation measure.

Zwick's second-step regression results for a specification in which works councils are assumed exogenous indicates that the innovative work practice(s) is positive and well determined, elevating productivity by 25 percent. However, accounting for the nonrandom distribution of works councils in an endogenous switching regression model shows that the pro-productive effect of participatory work practices (or one such practice) only obtains in works council firms. Although the story is similar to that told by Wolf and Zwick – in the sense that innovatory practices are conceived to rectify structural productivity deficits – the main result is very different: innovations only bear fruit in works council regimes. This result is analogous to that of COOKE (1994) for the United States (see Table 1, row 4). No other German study reaches so stark a conclusion. Unfortunately, the coefficient estimate for the participation variable in works council plants is only marginally significant and it is not clear that it differs from the statistically insignificant coefficient estimate for participation in the sample of plants without works councils.

One of the routes through which works councils and all voice institutions are supposed to influence productivity is by encouraging investments by the firm in training. Although the German literature has dwelt at some length on the labour turnover issue, there has been little direct analysis of further training. A rare exception is the final study in row 6 of Table 4, in which ZWICK (2002) examines the determinants of such training and its impact on labour productivity. As in the two preceding studies, the basic framework is again a mix of cross section and two-stage panel estimation with endogenous training. In addition to detailed establishment controls, the equations include three other innovative work practices. These are identical to those previously grouped under 'participation' in the row 5 study, namely, a shifting of responsibilities to lower levels in the hierarchy (termed 'employee participation'), the presence of teamwork and self-directed groups, and work groups/units with their own costs and results accounting. These three practices are now treated as exogenous, as is works council presence.

Zwick finds that training intensity (share of trained employees in the workforce) as well as several types of training (especially formal external training) have positive effects on productivity in cross section and in the second-step panel estimation procedure. In both cases, accounting for the endogeneity of training either by predicting training intensity or by including an inverse Mills ratio term (the probability of a training presence) in the regression tends to increases the magnitude of well determined coefficient estimates, suggesting that there is a greater tendency to train when productivity is low. The effect of the panel estimation is also to increase the measured impact of training. But of the other innovative work practices none is statistically significant in cross section and just one (shifting of responsibilities to lower levels in the hierarchy) is significant in most of the second-step panel estimates. A positive association between works council presence and productivity is discerned in cross section but in the second-step panel estimates the coefficient estimates for this variable are statistically insignificant throughout. Unlike the work practices, however, work councils are included as a determinant of training (i.e. training intensity) and their influence is positive and statistically significant, a result that is ascribed to the absence or attenuation of hold up – this time on the part of employers – in works council regimes.

The increasing sophistication of the German studies in the attempt to control for selection into either innovative working practices, including training, or works council status while taking account of unobserved plant heterogeneity has to be measured against the limitations of the data. As far as selection into works council status is concerned, we do know that works council presence is not random but is related to establishment size and the structure of the work force, among other things. However, the introduction or presence of a works council is not the result of a rational choice made by the owners or managers of an establishment based on comparing costs and benefits; rather, it is the results of actions taken by the employees. Employee action might well be related to the past performance of the establishment, but whether an establishment has a works council at a point in time should not be viewed as caused by contemporaneous productivity. This might suggest that

one can treat works council status as exogenous to the establishment, not least given the difficulties of identifying the works council equation in a convincing manner. Identification issues also loom large when it comes to the identifying equations for innovative work practices, including training. Understandably, analysts have switched between treating works councils and innovative work practices as endogenous according to the emphasis of the particular study, but this approach has produced some inconsistencies.

More might be expected from panel estimates that control for unobserved plant heterogeneity. Unfortunately, there is the problem that that works council status tends not to change over time – for example, in balanced panels from the IAB Establishment Panel, 1997-2000, around two percent of plants change their works council status. And as regards the innovative works practices, we lack longitudinal data altogether. Given the lack of temporal variation in works councils status and HPWPs for either reason, the Black-Lynch procedure has found favour. The problem is course that the estimated coefficients for works councils and innovative practices in the second step may be biased by reason of correlation between these variables and unobserved time-invariant establishment characteristics. For example, as noted earlier, better managers are more likely to be observed in plants with HPWPs so that what appears to be a productivity effect of innovative practices is good management. A further problem is that if we lack longitudinal information on HRWPs, we cannot assume that their frequency did not change materially over the sample period in question.

Despite these and other concerns (not least the lack of information on the numbers of workers covered by HPWPs and on 'type' of works council), the German literature suggests that works councils and innovative practices may have favorable effects on productivity. Indeed, we have reviewed material that attributes major productivity gains to each. But average wage council effects are unlikely to be strong. We mainly base this conclusion on estimates obtained for samples of plants employing between 21 and 100 workers where there is a 'balanced' representation of works council and non-works council establishments and where the powers of works councils are a datum. As far as HPWPs are concerned, it would be idle to claim that there is agreement as to which measures work. The disputation over profit sharing is the main case in point. Not surprisingly, therefore, when we come to consider the interaction between works councils and innovative work practices the situation is not transparent. But we think the evidence supports the notion that innovative work practices allow works council firms to achieve improved productivity if not necessarily higher productivity than non-works council firms.

One further caveat is the near exclusive focus in recent German work on the productivity outcome. We have no information on possible increases in labour costs occasioned by operating HPWPs, as suggested by some U.S. research. We do know that wages are higher in works council regimes (see Table 2, row 1), but we can infer little from this because there is no indication that works council presence has any effect on the excess of wages over those laid down under collective agreements. It remains a possibility that works councils may cause wage or incentive pay drift, or that they inflate nonwage costs, but there is as yet no real evidence to substantiate this.

Two final issues are whether works councils and HPWRs are substitutes or complements, and the status of the often-encountered argument that German employers would have to invent works councils were they not legislated. There is evidence to favour both

substitutability and complementarity. Examples of the former include the finding of a negative association between team-working and works council presence and the greater frequency of HPWPs in the absence of works councils (or, in their presence, where works councils are antagonistic). Examples of the latter are the positive association between works councils and group incentives and training.

The idea that works councils would have to be invented were they not legislated is certainly not a finding that leaps from the pages of the early works council literature or even from the more recent literature without qualification. One such qualification may be plant size. Unfortunately, it is difficult to test the argument that works councils are beneficial in large establishments. This is because nearly all such plants are covered by works councils, and conversely for small plants. Another qualification is that establishments may need to be covered by a collective agreement to blunt the bargaining or hold-up implications of codetermination. A final set of qualifications would presumably involve the contribution of innovative working practices and cooperative relations.

5. Conclusions

We have examined the effects of worker representation in unions and works councils, and of employee involvement/innovative work practices – and their interaction – on firm performance. In view of the doubts concerning the performance effects of high performance work practices and controversies surrounding the effects of worker representation – both of which aspects are addressed in our analysis – the results of the exercise might have been predicted to be both compartmentalized and pessimistic. But we have largely interpreted the worker representation literature as indicating that the effects of unions on productivity are likely to be small on average so that we should look to factors such as innovative work practices in explaining the diversity in the effects of worker representation in different settings. Expressed in terms of the theoretical conjectures on unions, the interaction of worker representation and HPWPs provides a practical means of peering inside the union black box. We would incline to the same interpretation of the works council institution, even if unobserved works council type may turn out to be a more important source of variation in overall performance.

We reported evidence of positive HPWP effects in both countries and also of positive interactions with worker representation. The suggestion is, then, that combinations of innovative practices and worker representation can yield substantial productivity gains. In Germany, HPWPs may be an important means of restoring competitiveness and works councils may assist in their introduction. Yet there should be no pretence to precision in all of this in the sense of the literature having uncovered a well determined hierarchy for productivity performance, or blueprint for the future of unions in particular. This is not unexpected and reflects the limitations of both literatures – namely, the notion of collective

voice and the high performance paradigm – underscored throughout by pronounced measurement difficulties. Here the cautionary remarks of WOOD/DE MENEZES (1998) based on the British experience (see below) are also apropos for the United States and Germany.

Addendum: The British Evidence on Unionism and Firm Performance

Introduction

There is no doubt that unions declined in Britain after 1979, after a period of period of substantial growth. At that time some 53 percent of workers were union members, but by 1999 this had fallen to 28 percent. Correspondingly, there also occurred a sharp fall in the share of employees whose wages are set by collective bargaining: from 70 percent in 1980 to around 45 percent in the mid-1990s. Moreover, all indicators of union presence point in the same direction, and for all sectors other than the public sector (MACHIN, 2000).

And since 1980 there have also occurred some profound changes in observed union effects, some of which are more controversial than others. We should perhaps preface our presentation of establishment performance outcomes – along the dimensions of financial performance, productivity, investment, employment, and plant closings – with some brief remarks on the course of the union-nonunion differential, one of the more controversial areas. It has been conventional to argue that the union premium remained more or less stable during the 1980s but declined fairly precipitously during the first half of the following decade (see STEWART, 1995; HILDRETH, 1999). That said, studies based on individual rather than workplace data pointed to persistence in the union premium of around 10 percent (e.g. BLANCHFLOWER, 1997). Nevertheless, the most recent work using individual-level data now seems to confirm the workplace findings (e.g. MACHIN, 2001), so that wage evidence does after all tend to favour a marked decline in the union differential. Today, the premium seems to have all but disappeared (e.g. BRYSON, 2002a).

Establishment Performance Outcomes

Profitability

Almost all of the early British studies pointed to negative effects of various indicators of union presence on financial performance/profitability. Some of the more recent evidence is reported in Table A.1. The starting point is the study by Machin and STEWART (1996) that identifies a sharp decline in the union effect on productivity over the first three WIRS. Note that by 1990 any negative effect was confined to closed shop or analogous situations in conjunction with some degree of market power. The second row contains the results of a replication of the previous study by ADDISON/BELFIELD (2001) using the 1998 WERS which, if anything, points to a sharper retardation in the negative effect of union recognition.

Table A1. Union Effects on Profitability

Study	Data / Methodology	EI/HPWP measure	Works council variable	Findings
1. Machin and Stewart (1996).	WIRS 80, WIRS 86; WIRS 90. Ordered Probit.	Financial performance.	Union recognition (manual), closed shop/management recommends unionism (manual).	Negative effect of union recognition halved during the 1950s. By 1990 a significantly negative effect was confined to the closed shop. Moreover, that effect was conditional on presence of market power (as proxied by relative size of the establishment).
2. Addison and Belfield (2001).	WERS 98. Ordered probit.	Financial performance	As above.	Coefficient estimates for union recognition and closed shop/management recommends unionism variables statistically insignificant throughout.
3. McNabb and Whitfield (1998).	WIRS 90. Probit.	Financial performance better than average.	Union recognition.	Union effect hinges on interaction with financial participation and employee involvement mechanisms. Union effect statistically insignificant in conjunction with financial participation. Union effect positive and statistically significant in the presence of employee involvement schemes, and is negative and statistically significant in their absence.
4. Addison and Belfield (2000).	WERS 98. Probit.	As above.	As above.	Coefficient estimate for union recognition statistically insignificant irrespective of employee involvement and financial participation mechanisms
5. Booth and McCulloch (1999).	WIRS 90. Ordered probit.	Financial performance.	Union recognition, closed shop; manual and nonmanual union recognition, manual closed shop, nonmanual closed shop.	Positive and statistically significant effect of union recognition; negative and statistically significant effect of closed shop. But these overall effects hinge on union type. Coefficient estimates for recognition and closed shop are only statistically significant for nonmanual unions.
6. Conyon and Freeman (2001).	WERS 98. Ordered probit.	Financial performance.	Union recognition.	Coefficient estimates for union recognition negative and statistically significant throughout.
7. Menezes-Filho	Sample of 494 firms,	Rate of return on	Union recognition/derecognition;	Coefficient estimates for union recognition negative and statistically

(1997).	1984-90. Pooled regressions, and fixed effect specification.	sales.	bargaining structure.	significant but declining through time. Strongest negative effects observed in single establishment firms and where different unions bargain jointly with the firm at the industry level. Fixed effects specifications show that derecognized firms have faster increases in profitability. Also fragmentation of bargaining structure associated with higher profitability.

Note: Unless otherwise indicated, financial performance is based on a five-element categorical measure derived from the manager respondent's assessment of the financial performance of the establishment relative to others in the same industry.

The study in the third row is of interest because it attempts to capture the effects of financial participation and employee involvement practices on financial performance. In particular, it is argued that employee involvement will be more capable of yielding a dividend where it is associated with financial participation – and, further, that different types of employee involvement and financial participation will vary in their impact on financial performance. Mixed effects are duly reported for union recognition: unions have positive impact where the organization practices downward communication and upward communication, but in the absence of such schemes the union effect is negative and statistically insignificant. But ADDISON/BELFIELD'S (2000) replication of this study (row 4) finds no statistically significant effect of union recognition for any concatenation of employee involvement and financial participation.

The study in row 5 allows for a wider variety of union measures. BOOTH/ MCCULLOCH (1999) find no evidence of a hierachy of (nonmanual) union effects on aggregate. However, disaggregation by union type – manual versus nonmanual – reveals such effects for nonmanual unions: the effect of 'recognition only' is negative and statistically significant and the presence of a closed shop increases the absolute value of the union effect. In contrast, manual unions have no discernible impact on financial performance.

The principal concern in the study by CONYON/FREEMAN (2001) is the role of (four types of) financial participation on financial performance (row 6), so that the union effects for the 1998 WERS cited in the table are secondary – and, interestingly, never commented on in the paper. As can be seen, the association between union recognition and financial performance is negative and statistically significant throughout (i.e. irrespective of the form of financial participation). Unlike the row 3 study, it is argued that employee involvement and financial participation are complementary.

The final study by MENEZES-FILHO (1999) is notable for its use of financial data per se, and incorporation of bargaining structure (and theory) (row 7). The main result is that although union firms have lower profitability overall this effect narrowed between 1984 and 1990, and had all but disappeared by the end of the sample period. That being said, consistent with the author's theoretical priors, there is evidence that profit retardation remains strongest in areas where unions have greater bargaining power. Bargaining power is shown to be greatest in single establishments (vis-à-vis multiestablishment undertakings) and among multiestablishment firms where the firm bargains jointly and an industry agreement applies.

Table A 2. . Union Effects on Productivity and Changes in Productivity

Study	Data / Methodology	EI/HPWP measure	Works council variable	Findings
1. Gregg, Machin, and Metcalf (1993).	328 trading firms from EXSTAT, 1984-89. Production function estimated using panel regression methods.	Growth in log real sales.	Union recognition, changes in union status.	For union recognition along, the union effect is negative and statistically insignificant for 1984-97, but positive and statistically significant for 1988-89 (+3-4%). For changes in union status, repudiation of the closed shop has no incremental impact over (favorable) effect of union presence (1988-89) but derecognitions considerably elevate differential productivity growth of union sector.
2. Conyon and Freeman (2001).	(i) 284 firms, 1995-98. Fixed effects production function estimates.	Log real sales.	Union recognition.	Union effect negative but statistically insignificant throughout.
	(ii) WERS 98. Ordered probit.	Relative labour productivity.	Union recognition.	Union effect negative but statistically insignificant throughout.
3. Moreton (1999).	WIRS 98. Ordered probit.	Relative labour productivity and union density.	Union bargaining power, proxied by separate multi-unionism and firm endorsement of union membership, inter al.	Multiunionism associated with significantly lower productivity. Where management recommends unionism there is a positive effect on labour productivity. Also some suggestion that union effect might be positive where labour demand elasticity is higher.
4. Fernie and Metcalf (1995).	WIRS 90.	(i) Relative labour productivity.	Union recognition alone. Pre-entry closed shop, post-entry closed shop, management recommends union member-ship, union recognition only.	For the one-dimension measure, the union effect is negative but only marginally significant. For the fuller representation, no hierarchy of effect beyond union recognition only, which is negatively signed and highly significant.

		(ii) labour productivity improvement, 1987-90.	As above.	For the one-dimension dimension measure, the union effect is negative but only marginally significant. For the fuller representation, only the pre-entry closed shop is associated with significantly lower productivity growth.
5. Addison and Belfield (2001).	WERS 98.	(i) As above.	As above.	Coefficient estimates for each union measure are negative but statistically insignificant throughout.
		(ii) As above.	As above.	For union recognition alone, the union effect is positive and statistically significant. For the fuller representation, no hierarchy of effect beyond union recognition only, which is again positively signed and highly significant.

Note: The relative labour productivity measure is a categorical variable based on management perceptions of labour productivity of the workplace compared with other similar workplaces (WIRS 90) or workplaces in the same industry (WERS 98). The labour productivity improvement measure is a categorical variable based on management perceptions of the level of labour productivity at the survey date relative to 3 years earlier (WIRS 90) or 5 years earlier (WERS 98).

Productivity

The sparse early British evidence points to negative effects of unionism on firm and establishment productivity, despite contemporaneous estimates of the union wage premium of around 10 percent (e.g. MACHIN, 1991). The dominant theme of the newer literature reviewed in Table A.2 is that unionized firms/plants increased their productivity most at the end of the 1980s (and arguably in 1979-84 too) and/or that there is no longer evidence of a productivity shortfall in union firms/establishments. The evidence is not overwhelming, however, so that it would be premature to claim more than what has been observed is a reduction in the disadvantages of unionism. The relevant factors here include the possibility that least productive unionized undertakings may have been evolved out of the system (for this reason the empirical suggestion that the union effects were most positive in situations where competitive pressures were more acute is not altogether compelling), the fact that the strongest productivity gains are actually reported for union derecognitions, and to some degree the odd timing of the observed spurts of improvement.

As in the case of parallel developments in profitability, reviewed earlier, it is conventional to ascribe the observed changes to the impact of the Thatcher reforms in conjunction with heightened competitive pressures (e.g. GREGG/MACHIN/METCALF, 1993, p.895). At issue of course is whether the observed changes will persist. Also worrying is the apparent shift in the effects of other covariates – not just the union argument – on the productivity outcome indicators in the WIRS/WERS.

Investment

Consistent with the U.S. evidence reviewed in the main paper, the early British research also provides evidence of some negative effects of unions on investment in physical capital (DENNY/NICKELL, 1992). However, this does not carry over to investments in intangible capital. While they are able to replicate HIRSCH'S (1991) results for the United States, MENEZES-FILHO/ULPH/VAN REENEN (1998) do not obtain similar results for the United Kingdom. Indeed, in their recent review, MENEZES-FILHO/VAN REENEN (2003) contrast the very different results for the United States on the one hand and Britain and continental Europe on the other. Although the association between unionism and R&D is negative in this bloc as well, it is seemingly driven by unions being concentrated in older, low-tech industries. In interpreting these results, the authors critique the notion that unions will hold up firms by expropriating sunk R&D investments through demanding higher wages while also observing that the hold-up problem may be mitigated by strategic incentives to compete in R&D races. The latter such considerations imply that the union effect on R&D might exhibit nonlinearities – being positive at lower levels of union density.

Employment

We turn next to the evidence of union effects on employment, broadly interpreted. There is reasonable agreement in the WIRS/WIRS on the seeming role of unions in retarding employment growth or exaggerating employment reduction. As can be seen from Table A.3, there is the suggestion that unionized establishments in the 1980s tended to grow by 3

percent less per year than their nonunionized counterparts. There was some early disputation over the results reported by BLANCHFLOWER/MILLWARD/OSWALD (1991) for 1980-84 because of the concern that unionized firms at this time were more likely to see an erosion of restrictive practices (partly related to overmanning arrangements and demarcation) so that union plants were more likely to be shedding labour. But this criticism does not seem to be unduly damaging. First, the organizational change measure in the WIRS used to proxy such reform of working conditions does not overturn the negative impact of the union density measure on employment for the specific time period under consideration. Second, BOOTH/MCCULLOCH (1999) (row 2) report for later intervals that the union effect on employment is robust to the inclusion of organizational change measures. Subject to obvious limitations – the data-driven failure to model the dynamics of the employment adjustment process – there is a large measure of accord in repeated cross sections of the workplace surveys that union slow job growth.

That said, there is some lingering ambiguity as to some other relationships in the employment change equations. Thus, for example, ADDISON/BELFIELD (2001) (row 4) report very different findings for financial participation arguments than do FERNIE/METCALF (1995) (row 3). On the other hand, neither finds evidence of a hierarchy of union effects (i.e. greater retardation of employment growth/heavier employment decline in circumstances where unions are more powerful). In this connection, BRYSON (2002b) has recently argued that stronger unions are more likely to bargain over employment so that one should not expect to see declines in employment for this subset of unions.

Not shown in the table is union impact on quits and absenteeism rates. But there is no disagreement in successive WIRS/WERS of the union role in reducing quits, even if the data are less than ideal. Rather, disagreement centres on absenteeism rates: ADDISON/BELFIELD (2001) report sharply higher absenteeism rates in union regimes using WERS 98 whereas FERNIE/METCALF (1995) report no such association for WIRS 90. There has been no investigation in Britain of the effect of quits in improving productivity and of absenteeism in reducing it.

Table A 3. Union Effects on Employment

Study	Dataset / Methodology	Outcome measure	Union variable	Findings
1. Blanchflower, Millward, and Oswald (1991).	WIRS 84. OLS	Log employment (effectively an employment change equation as coefficient estimate on lagged dependent variable approximates 1).	Union recognition; union density; post-entry closed shop, pre-entry closed shop, membership.	Coefficient estimate for union recognition is negative and statistically significant. Effect of density is better determined . Together the recognition and density results imply that union establishments contract 3 percentage points more per year than their nonunion counterparts. Allowing for different union types, union membership and pre-entry closed shop are associated with lower employment growth (though the latter variable is poorly determined) while the effect of the post-entry closed shop is positive and statistically significant.
2. Booth and McCulloch (1999).	WIRS 90. OLS.	Change in log employment, 1989-90 and 1987-90.	Union recognition.	Coefficient estimate for union recognition is negative and statistically significant throughout. The union-induced reduction in employment growth is 2.6% (5.7%) for 1989-90 (1987-90).
3. Fernie and Metcalf (1995).	WERS 90. OLS.	Change in employment 1984-90.	Union recognition only; pre-entry closed shop, post-entry closed shop, management recommends unionism, recognition alone.	For union recognition only, the association between employment change and union recognition is negative and statistically significant. For the fuller characterization of unionism, the coefficient estimates for all but the post-entry closed shop are negative and highly statistically significant. No hierarchy of effect.
4. Addison and Belfield (2001).	WERS 98. OLS.	Change in employment, 1993-98.	As above.	For union recognition only, the association between employment change and union recognition is negative and highly statistically significant. For the fuller characterization of unionism, only the two weaker measures of union presence are associated with a material reduction in quits.

Plant Closings

The last outcome indicator we examine is plant closings. The evidence summarized in Table A.4 is again mixed. Studies based on WIRS 84 reveal scant evidence of any association between unionism and plant closings, irrespective of the union measure (see row 1). Note also the absence of a hierarchy of union effect: more powerful unions, as proxied by the magnitude of the wage premium or presence of the closed shop, have no discernible incremental effect on closings.

The plot thickens when we come to consider the most recent evidence. Broadly speaking, the sign of the coefficient estimate for the union variable is positive and statistically significant in the two studies using WERS 98 (rows 2-3). But this broad result hides as much as it reveals. Although reporting a material and robust positive association between either of two measures of unionism – recognition for collective bargaining purposes and union coverage – ADDISON/HEY-WOOD/WEI (2001) find that this relation holds only for establishments that are part of larger (i.e. multiestablishment) undertakings. For single-plant entities (here firms), the direction of the association is reversed. (All studies support the more general result that single independent plants are less likely to close than their counterparts that are part of multi-establishment undertakings). The authors interpret the former result as consistent with a decline in union bargaining power in the wake of a decade of anti-union legislation, either by emboldening employers in multi-plant enterprises to close unionized establishments, or by weakening union influence over employment in such settings (see MACHIN, 1993). The single-plant result, on the other hand, is rationalized in terms of (differential) union concessions in conjunction with rents.

While not contesting these findings, the recent study by BRYSON (2004) (row 4) offers a very different interpretation of the positive association between plant closings and unionism. Rather, it is now union weakness – accentuated by the legislation – that is said to explain the sea change in union effect detected in the more recent workplace survey. Bryson reports that where unions are strong the coefficient estimate for unionism is no longer statistically significant. Stronger unions are identified by the closed shop and a combination of high density, bargaining coverage and on-site representatives, inter al. The 'weak union' result is taken to be consistent with such unions being an ineffective voice for workers – and an inefficient agent for management as well – and conversely for strong unions. However, while downplaying rent seeking and emphasizing the ineffective voice/weakened agency function of weak unions, Bryson reports that where unions bargain over physical working conditions, the likelihood of closure is increased.

Table A.4. Union Effects on Plant Closings

Study	Dataset/ Methodology	Outcome measure	Union variable	Findings
1. Machin (1995).	1984 WIRS, using data on plants that subsequently closed from the WIRS 1984-90 Panel. Probit model.	Union recognition.	Log number of employees, proportion nonmanual workers, single plant, manufacturing dummies, below average financial performance, operating well below capacity.	Union recognition effect statistically insignificant both overall and by type of union (manual and nonmanual), and in the presence or otherwise of the closed shop. Result robust to inclusion of one-digit industry dummies.
2. Addison, Hey-wood, and Wei (2003).	1990 WIRS, using data on plants that subsequently closed from WERS 1990-98 Panel. Probit model.	Union recognition; union coverage.	Establishment size, establishment age, proportion female, proportion manual, proportion professional/technical, proportion short-term contracts, wide range of employee-involvement and participation mechanisms, industrial relations climate, technology variables, flexibility at workplace, change in ownership, market power, layoff experience, export exposure, regional unemployment rate, one-digit and more detailed (three or four digit) industry controls.	Robust positive and statistically significant association between union measures and probability of plant closure. But the result is driven by plants that are part of multi-establishment undertakings. For single-establishment firms, the union effect(s) is negative and generally statistically insignificant.
3. Bryson (2004).	As above. Probit model.	Union recognition; union strength (3 measures); union type; number of unions; bargaining arrangements (e.g. single vs. joint bargaining); and bargaining scope.	Industry-level union density, log number of employees, proportion non- manual, single plant, (10) regional dummies, (18) two-digit industry controls, degree of competition, use of flexible contracts, financial performance better than average, operating considerably below capacity, increase in employment.	Union measure(s) positively associated with plant closure. But magnitude and significance of the effect is sensitive to form of measure. Statistically significant effects where union is weak, for manual worker unions, single unions, and where union bargains over physical working conditions.

Unions, Employee Involvement and Other Workplace Practices

As we have seen, two of the studies considered earlier examine the association between unionism and employee involvement/financial participation and financial performance. But the key study is WOOD/DE MENEZES (1998), exploiting data from the 1990 WIRS and the Employers' Manpower and Skills Practices Survey. The authors first attempt to test whether the range of employee involvement and participative mechanisms used in the literature form a unity and can be used as indicators of a high commitment orientation on the part of management. Wood and de Menezes use latent variable analysis to search for identifiable patterns in the use of twenty-three such practices. They are unable to identify high commitment management as a well-defined continuous variable. But they are able to fit a latent class model to the data, that is, identify a progression of types of high commitment management. There are four such types: high HCM, medium-low HCM, low-medium HCM, and low HCM.

As far as unionism is concerned, Wood and de Menezes first examine the association between union recognition and high commitment management. Neither high HCM nor low HCM workplaces emerge as distinctive with respect to unionism. This suggests among other things that the tendency of the (British) industrial relations literature to treat nonunion workplaces as 'bleak authoritarian houses' is erroneous. Second, the authors include the establishment's HCM class as an argument in conventional performance equations alongside unionism and controls for workplace characteristics and industry affiliation. They examine seven such performance outcomes: labour productivity, change in labour productivity, financial performance, job creation, employee relations climate, quits, and absenteeism. High HCM establishments are not found to be more effective than others. That is, in no case do they perform better than all the others on any performance criteria. For example, although high HCM plants do have better employment growth and better financial performance that the two medium HCM categories, this does not carry over to the low HCM plants. Evidently different types of plants can perform differently according to the outcome measure. The plot only thickens when it comes to the effect of union recognition since five out of seven coefficient estimates are negative, of which four are statistically significant. (For a more optimistic interpretation, see METCALF, 2003.)

Interpretation

We have discussed changes in the impact of British unionism on firm performance, examining en passant the modern notion that the decline in union influence has downside efficiency consequences. Our findings may be summarized as follows. First, there is evidence of a diminution of union effects on wages, financial performance and productivity through time. As the measures are not commensurate, we cannot quantify the degree of efficiency improvement stemming from these changes in unionized regimes. Arguably, the economic impact could have been small, but we incline to the view that more than redistribution (from workers) has been involved. But by the same token, certain unfavourable effects of unionism persist (e.g. slower employment growth and higher absenteeism) and so it is also appropriate to conclude that there has been a reduction in the disadvantages of unionism, not a reversal. Larger efficiency gains are likely to have accrued from the decline in union density and the ability of newly formed enterprises to avoid union organization.

Second, we have found little direct support for the revisionist notion that the reduction in union power is responsible for worse outcomes. The argument that unions have to be strong to be an effective vehicle of pro-productive voice and to act as an authoritative agent of the employer principal has been found to be pushing things too far (ADDISON/BELFIELD, 2004). In the specific context of plant closings given that there is no evidence of a union effect in the WIRS 84, why should the reduction in union power have yielded a significantly positive association between union recognition/density and plant closings in the WERS 90? The Bryson argument would be that the legislation led to weaker unions that could neither deliver voice nor act as a responsible agent of the employer. Unfortunately, the test hinges on differences in effect between strong and weak unions rather changes in union power. We favour the alternative efficiency argument that there were too few closings in earlier years. In other words, we would argue from the finding for multiestablishments in the literature (see Table A.4, row 3) that management in such undertakings have taken the opportunity to rid themselves of inefficient plants. This contention gels with the reasoning of MANNING (1993), who argues that the requirement for pre-strike ballots (under the Conservative administration's Trade Union Act of 1984) may have led to a loss of union influence over employment. Unions, so the argument goes, had hitherto kept open unprofitable plants by threatening to strike profitable ones. The new need to ballot members destroyed the credibility of this mechanism because workers whose jobs were not in jeopardy would not vote for a strike.

Caveats attach to the interpretation that the workplace surveys unambiguously reveal evidence of a decline in union influence (see, in particular, the analysis of the WERS 98 panel by ADDISON/BELFIELD, 2002). A final issue is the interaction between unionism and high performance work practices. Here the British evidence has nicely exposed the ambiguities in the literature rather than advanced that literature.

References

ACEMOGLU, D. and PISCHKE, J-S. (1999). The structure of wages and investment in general training. Journal of Political Economy, 107, pp. 539-72.

ADDISON, J.T. and BELFIELD, C.R. (2004). Union voice. Journal of Labor Research, 25, pp. 563-96.

ADDISON, J. T. and BELFIELD, C. R. (2000). The impact of financial participation and employee involvement on financial performance: a re-estimation using the 1998 WERS. Scottish Journal of Political Economy, 47 (November): 571-83.

ADDISON, J. T. and BELFIELD, C. R. (2001). Updating the determinants of firm performance: estimation using the 1998 WERS. British Journal of Industrial Relations, 39, 341-66.

ADDISON, J. T. and BELFIELD, C. R. (2002). The impact of unions and employee involvement on workplace performance: panel data evidence from the United Kingdom. Unpublished Paper, Department of Economics, University of South Carolina.

ADDISON, J. T. and BELFIELD, C. R. (2004). Unions and establishment performance: evidence from the British Workplace Industrial/Employee Relations Surveys. In Phanindra V. Wunnava (ed.), The Changing Role of Unions – New Forms of Representation. Armonk, New York: M.E. Sharpe, pp. 281-319.

ADDISON, J. T. and BELFIELD, C. R. (2007). Training, unions, and firm performance. Zeitschrift für ArbeitsmarktForschung, 40.

ADDISON, J.T., BELLMANN, L., and KÖLLING, A. (2004). Works councils and plant closings in Germany. British Journal of Industrial Relations, 42, pp. 125-48.

ADDISON, J. T., HEYWOOD, J. S. and WEI, X. (2003). New evidence on unions and plant closings: Britain in the 1990s. Southern Economic Journal, 69, 822-41.

ADDISON, J.T., and HIRSCH, B.T. (1989). Union effects on productivity, profits and growth: has the long run arrived? Journal of Labor Economics, 7, pp. 72-105.

ADDISON, J.T., KRAFT, K., and WAGNER, J. (1993). German works councils and firm performance. In B.E. Kaufman and M.M. Kleiner (eds.), Employee Representation: Alternatives and Future Directions. Madison, WI: Industrial Relations Research Association, pp. 305-38.

ADDISON, J.T., SCHANK, T., SCHNABEL, C., and WAGNER, J. (2003). German works councils in the production process. Discussion Paper No. 812. Bonn: Institute for the Study of Labour/IZA.

ADDISON, J.T., SCHANK, T., SCHNABEL, C., and WAGNER, J. (2006). Works councils, labour productivity and plant heterogeneity: first evidence from quantile regressions. Jahrbücher für Nationalökonomie und Statistik, 226, 505-18.

ADDISON, J.T., SCHNABEL, C., and WAGNER. (2004). The course of research into the economic consequences of German works councils. British Journal of Industrial Relations, 42, pp. 255-81.

ADDISON, J.T, and TEIXEIRA, P. (2004). The effect of worker representation on employment behaviour in Germany: another case of -2.5%. Discussion Paper No. 1188. Bonn: Institute for the Study of Labour/IZA.

ADDISON, J.T., TEIXEIRA, P., and ZWICK, T. Works councils and the anatomy of wages. Discussion Paper No. 2474. Bonn: Institute for the Study of Labour/IZA

APPLEBAUM, E. and BATT, R. (1984). The New American Workplace: Transforming Work Systems in the United States. Ithaca, NY: ILR Press.

BALDWIN, C.Y. (1983). Productivity and labour unions: an application of the theory of self-enforcing contracts. Journal of Business, 56, pp. 155-85.

BLACK, S. and LYNCH, L.M. (2000). What's driving the new economy: the benefits of workplace innovation. NBER Working Paper No. 7479 (Revised October 2000).

BLACK, S. and LYNCH, L.M. (2001). How to compete: the impact of workplace practices and information technology on productivity. Review of Economics and Statistics, 83, pp. 434-45.

BLANCHFLOWER, D. G. (1997). Changes over time in union relative wage effects in Great Britain and the United States. Unpublished paper, Dartmouth College.

BLANCHFLOWER, D. G., MILLWARD, N., and OSWALD, A. J. (1991). Unionism and employment behaviour. Economic Journal, 101, 815-34.

BOOTH, A. L. and MCCULLOCH, A. (1999). Redundancy pay, unions and employment." Manchester School, 67, pp. 346-66.

BROWN, C. and MEDOFF, J.L. (1978). Trade unions in the production process. Journal of Political Economy, 86, pp. 355-78.

BRYSON, A. (2002a). The union membership premium: an analysis using propensity score matching. Unpublished Paper, Policy Studies Institute, January.

BRYSON, A. (2002b). Unions and workplace performance: what is going on? Unpublished Paper, Policy Studies Institute.

BRYSON, A. (2004). Unions and workplace closure in Britain, 1900-1998. British Journal of Industrial Relations, 42, pp. 283-302.

CAPPELLI, P. and NEUMARK, D. (2001). Do high-performance work practices improve establishment-level outcomes? Industrial and Labor Relations Review, 54, pp. 737-75.

CAVANAUGH, J.K. (1998). Asset-specific investment and unionized labour. Industrial Relations, 37, pp. 35-50.

CLARKE, K.B. (1984). Unionization and firm performance: the impact on profits, growth, and productivity. American Economic Review, 74, pp. 893-919.

CONYON, M. J., FREEMAN, R. B. (2001).Shared modes of compensation and firm performance: U.K. evidence. Working Paper 8448, National Bureau of Economic Research, August.

COOKE, W.N. (1992). Product quality improvement through employee participation: the effects of unionization and joint union-management administration. Industrial and Labor Relations Review, 46, pp. 119-34.

COOKE, W.N. (1994). Employee participation programmes, group-based incentives, and company performance: a union-nonunion comparison. Industrial and Labor Relations Review, 47, pp. 594-609.

DENNY, K. and NICKELL, S. J. (1992). Unions and investment in British industry." Economic Journal, 102, pp. 874-87.

DILGER, A. (2002). Ökonomik betrieblicher Mitbestimmung. Munich and Mering: Rainer Hampp Verlag.

DiNARDO, J. and LEE, D.S. (2002). The impact of unionization on establishment closure: a regression discontinuity analysis of representation elections. Working Paper No. 8993, National Bureau of Economic Research

DUSTMANN, C. and SCHÖNBERG, U. (2004). Training and union wages. Discussion Paper No. 1435. Bonn: Institute for the Study of Labour/IZA.

FALLICK, B.C. and HASSETT, K.H. (1999). Investment and union certification. Journal of Labor Economics, 17, pp. 570-82.

FERNIE, S. and METCALF, D. (1995).Participation, contingent pay, representation and workplace performance: evidence from Great Britain. British Journal of Industrial Relations, 33, pp. 379-415.

FITZENBERGER, B., KOHN, K., and LEMBCKE, A.C. (2008). Union density and varieties of coverage: the anatomy of union wage effects in Germany. Discussion Paper No. 3356. Bonn: Institute for the Study of Labour/IZA.

FITZROY, F. and KRAFT, K. (1985). Unionization, wages, and efficiency: theories and evidence from the U.S. and West Germany, Kyklos, 38, pp. 537-54.

FITZROY, F. and KRAFT, K. (1987). Efficiency and internal organization: works councils in West German firms. Economica, 54, pp. 493-504.

FITZROY, F. and KRAFT, K. (1990). Innovation, rent-sharing and the organization of labour in the Federal Republic of Germany, Small Business Economics, 2, pp. 95-103.

FITZROY, F. and KRAFT, K. (1995). On the choice of incentives in firms. Journal of Economic Behavior and Organization, 26, pp. 145-60.

FORTH, J. and MILLWARD, N. (2004). High involvement management and pay in Britain. Industrial Relations, 43, pp. 98-119.

FREEMAN, R.B. (1976). Individual mobility and union voice in the labour market. American Economic Review, Papers and Proceedings, 66, pp. 361-68.

FREEMAN, R.B., KLEINER, M.M., and OSTROFF, S. (2000). The anatomy of employee involvement and its effects on firms and workers. Working Paper 8050, National Bureau of Economic Research.

FREEMAN, R.B. and LAZEAR, E.P. (1995). An economic analysis of works councils. In J. Rogers and W. Streeck (eds.), Works Councils, Consultation, Representation and Cooperation in Industrial Relations. Chicago, IL: University of Chicago Press.

FREEMAN, R.B. and MEDOFF, J.L. (1984). What Do Unions Do? New York, N.Y.: Basic Books.

FRICK, B. (2002). High performance work practices und betriebliche Mitbestimmung: komplementär oder substantive? Industrielle Beziehungen, 9, pp. 79-102.

FRICK, B. and MÖLLER, I. (2003). Mandated works councils and firm performance: labour productivity and personnel turnover in German establishments. Schmollers Jahrbuch, 123, pp. 435-54.

GERLACH, K. and JIRJAHN, U. (2001). Employer provided further training: evidence from German establishment data. Schmollers Jahrbuch, 121, pp. 139-64.

GERLACH, K. and STEPHAN, G. Wage settlements and wage setting; results from a multi-level model. Applied Economics, 37, pp. 2297-306.

GERLACH, K. and STEPHAN, G.(2006). Pay policies of firms and collective wage contracts- an uneasy partnership. Industrial Relations, 45, 47-67.

GODARD, J. (2004). A critical assessment of the high-performance paradigm. British Journal of Industrial Relations, 42, pp. 349-78.

GÜRTZGEN, N. (2005). Rent-sharing and collective bargaining coverage – evidence from linked employer-employee data. Discussion Paper No. 05-90. Mannheim: Zentrum für Europäische Wirtschaftsforschung/Centre for European Economic Research.

GÜRTZGEN, N. (2006). The effect of firm- and industry-level contracts on wages – evidence from longitudinal linked employer-employee data. Discussion Paper 06-82. Mannheim: Zentrum für Europäische Wirtschaftsforschung/Centre for European Economic Research.

HANDEL, M.J. and LEVINE, D.I. (2004). Editor's introduction: the effects of new work practices on workers. Industrial Relations, 43, pp. 1-43.

HILDRETH, A. (1999). What has happened to the union wage differential in Britain in the 1990s? Oxford Bulletin of Economics and Statistics, 61, pp. 5-31.

HIRSCH, B.T. (1991). Labor unions and the economic performance of U.S. firms. Kalamazoo, MI: Upjohn Institute for Employment Research, 1991

HIRSCH, B.T. (2004). What do unions do for economic performance? Journal of Labor Research, 25, pp. 415-55.

HIRSCH, B.T. and MORGAN, B.A. (1994). Shareholder risk and returns in union and nonunion firms. Industrial and Labor Relations Review, 47, pp. 302-18.

HÜBLER, O. and JIRJAHN, U. (2003). Works councils and collective bargaining in Germany: the impact on productivity and wages. Scottish Journal of Political Economy, 50, pp. 471-91.

HUSELID, M.A. (1995). The impact of human resource management practices on turnover, productivity, and corporate financial performance. Academy of Management Journal, 38, pp. 635-70.

HUSELID, M.A. and BECKER, B.E. (1996). Methodological issues in cross-sectional and panel estimation of the human resource-firm performance link. Industrial Relations, 35, pp. 400-22.

ICHNIOWSKI, C. (1990). Human resource management systems and the performance of U.S. manufacturing businesses. Working Paper No. 3349, National Bureau of Economic Research.

ICHNIOWSKI, C., KOCHAN, T.A., LEVINE, D., OLSON, C., and STRAUSS, G. (1996). What works at work: overview and assessment. Industrial Relations, 35, pp. 299-333

ICHNIOWSKI, C., SHAW, K., and PRENNUSHI, G. (1997). The effect of human resource management practices on productivity: a study of steel finishing lines. American Economic Review, 87, pp. 291-313.

JIRJAHN, U. (2003). Executive incentives, works councils and firm performance. Schmollers Jahrbuch, 123, pp. 397-421.

KLEINER, M.M., LEONARD, J.S., and PILARSKI, A.M. (2002). How industrial relations affects plant performance: the case of commercial aircraft manufacturing. Industrial and Labor Relations Review, 55, pp. 195-218.

KÖLLING, A. (2000). The IAB establishment panel. Schmollers Jahrbuch, 120, pp. 291-300.

LaLONDE, R.J., MARSCHKE, G. and TROSKE, K. (1996). Using longitudinal data on establishments to analyze the effects of organizing campaigns in the United States. Annales d'Economie et de Statistique, 41/42, pp. 155-85.

LEVINE, D.I. (1995). Reinventing the workplace: how business and employees can both win. Washington, DC: The Brookings Institution.

LEVINE, D.I. and TYSON, L.D. (1990). Participation, productivity, and the firm's environment. In A.S. Blinder (ed.), Paying for Productivity. Washington, D.C.: The Brookings Institution.

MACHIN, S. (1991). The productivity effects of unionism and firm size in British engineering firms. Economica, 58, pp. 479-90.

MACHIN, S. (2000). Union decline in Britain. British Journal of Industrial Relations, 38, pp. 631-45.

MACHIN, S. (2001). Does it still pay to be in a union or join a Union? Unpublished Paper, University College London.

MACHIN, S. and STEWART, M. (1996). Trade unions and financial performance. Oxford Economic Papers, 48, pp. 213-41.

MACHIN, S. and WOOD, S. (2005). HRM as a substitute for trade unions in British workplaces. Industrial and Labor Relations Review, 58, pp. 201-18.

MALCOMSON, J.M. (1983). Trade unions and economic efficiency. Economic Journal, 93, pp. 50-65.

MANNING, A. (1993). Pre-strike ballots and wage-employment bargaining. Oxford Economic Papers, 45, pp. 422-29.

MCNABB, R. and WHITFIELD, K. (1998). The impact of financial participation and employee involvement on financial performance. Scottish Journal of Political Economy, 45, pp. 171-87.

MENEZES-FILHO, N. (1997). Unions and profitability over the 1980s: some evidence on union-firm bargaining in the United Kingdom. Economic Journal, 107, pp. 651-70.

MENEZES-FILHO, N., ULPH, D. and VAN REENEN, J. (1998). R&D and union bargaining power: evidence from union companies and establishments. Industrial and Labor Relations Review, 52, pp. 45-63.

MENEZES-FILHO, N. and VAN REENEN, J. (2003) Unions and innovation: a survey of the theory and empirical evidence. In John T. Addison and Claus Schnabel (eds.), International Handbook of Trade Unions. Cheltenham, England, and Northampton, Mass.: Edward Elgar, pp. 293-334.

METCALF, D. (2003). Unions and productivity, financial performance and investment: international evidence. In John T. Addison and Claus Schnabel (eds.), International Handbook of Trade Unions. Cheltenham, England, and Northampton, Mass.: Edward Elgar, 2003, pp. 118-171.

MILGROM, P. and ROBERTS, J. (1995). Complementarities and fit: strategy, structure and organizational change in manufacturing. Journal of Accounting and Economics, 19, pp. 179-208.

MORETON, D. (1999). A model of labour productivity and union density in British private sector unionized establishments. Oxford Economic Papers, 51, pp. 322-44.

SCHANK, T., SCHNABEL, C., and WAGNER, J. (2004) Works councils: sand or grease in the operation of German firms. Applied Economic Letters, 11, pp. 159-61.

SCHNABEL, C., and WAGNER, J. (1994). Industrial relations and trade union effects on innovation in Germany. Labour, 8, pp. 489-503.

STEWART, M. (1995). Union wage differentials in an era of declining unionization. Oxford Bulletin of Economics and Statistics, 57, pp. 143-66.

TUC. (1999). Partners for progress: new unionism at the workplace. London, England: Trade Union Congress.

WOOD, S. and DE MENEZES, L. (1998). High commitment management in the U.K.: evidence from the Workplace Industrial Relations Survey, and Employers' Manpower and Skills Practices Survey. Human Relations, 51, pp. 485-515.

WOOD, S. and GODARD, J. (1999). The statutory recognition procedure in the Employment Relations Bill: a comparative analysis. British Journal of Industrial Relations, 37, pp. 203-44.

WOLF, E. and ZWICK, T. (2002). Reassessing the impact of high performance workplaces. Discussion Paper No. 02-07. Mannheim: Zentrum für Europäische Wirtschaftsforschung/Centre for European Economic Research.

ZWICK, T. (2002). Continuous training and firm productivity in Germany. Discussion paper No. 02-50. Mannheim: Zentrum für Europäische Wirtschaftsforschung/Centre for European Economic Research.

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