

## German Industrial Relations: An Elusive Exemplar

Addison, John T.; Schnabel, Claus; Wagner, Joachim

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**John T. Addison, Claus Schnabel, Joachim Wagner\***

## German Industrial Relations: An Elusive Exemplar\*\*

*The German system of industrial relations has long held a certain cachet outside that country. Recently, economists have joined its diverse group of supporters, noting in particular the potential efficiency benefits of the dual system. In the present paper, we investigate what has been learned about the effects of unionization and works councils on firm performance, and attempt to draw some lessons of wider application. We can find little evidence to suggest that these institutions are in practice associated with enhanced performance. For both this reason and the likely non-portability of German institutions, we would conclude that the notion that German industrial relations provide an exemplar to which others should aspire is premature at best.*

*Das deutsche System der industriellen Beziehungen genießt im Ausland seit langem einen guten Ruf. Zu den Befürwortern gehören seit kurzem auch Ökonomen, die insbesondere die potentiellen Effizienzvorteile des dualen Systems hervorheben. Im vorliegenden Beitrag untersuchen die Autoren, welche Wirkungen von Gewerkschaften und Betriebsräten auf die Unternehmensleistungen ausgehen und versuchen, daraus Schlüsse für die weitergehende Anwendungen zu ziehen. Es lassen sich wenig empirische Belege dafür finden, daß diese Institutionen mit verbesserten Unternehmensleistungen einhergehen. Deshalb, und weil die deutschen Institutionen kaum übertragbar zu sein scheinen, schlußfolgern die Autoren, daß eine Haltung, die dem deutschen System industrieller Beziehungen eine Vorbildfunktion für andere Länder zuweist, bestenfalls als verfrüht einzustufen ist.*

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\* Dr. John T. Addison, Professor, Department of Economics, College of Business Administration, University of South Carolina, Columbia, S.C. 29208, U.S.A.

Dr. Claus Schnabel, Institut der deutschen Wirtschaft, Gustav-Heinemann-Ufer 84-88, D-50968 Köln, Germany.

Dr. Joachim Wagner, Professor, Institut für Volkswirtschaftslehre, Universität Lüneburg, D-21332 Lüneburg, Germany.

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## 1. Introduction

Today it is fashionable in international circles to look with favor upon the German industrial relations system. For example, it would appear to be the case that the European Commission has had Germany in mind as some sort of template in designing those of its social policy initiatives with a bearing on worker information, consultation, and participation rights. Whatever the theoretical attraction of the German "model," the fact remains that relatively little is known about the economic performance of industrial relations institutions in that country, even if from the perspective of strikes they fit the description of being "concertative."

The present exercise focuses on such considerations. Specifically, we shall examine the impact of unions and works councils in a largely micro context, thus eschewing comparative analysis on the covariation of concertative institutions and macroeconomic outcomes such as unemployment and growth. Our goal is to ascertain what has been learned about the efficiency of German unions and works councils and to detect if there are indeed any obvious lessons of wider application.

The plan of the paper is as follows. We begin by sketching in some theoretical detail to provide perspective on the role of worker representation in general, and to signal any characteristics that may differentiate German institutions. There follows a review of the German evidence, focusing on productivity, profitability, and investments in physical and intangible capital. Mention is made of the international experience along these performance indicators only *en passant*. We then take stock and question the potential for grafting German-type institutions on to other systems. A brief section concludes.

## 2. Theoretical Conjectures

The conventional neoclassical model views unions as distortionary elements - literally, combinations in restraint of trade. On this view, not only do unions cause disemployment (and output losses) as unionized firms move up their demand curve for labor in response to the union wage premium but they also waste resources in establishing and maintaining their monopoly prices or rents. Although the effect on capital usage is indeterminate, being the net outcome of substitution and scale effects, the misallocation of resources is not in doubt: too few workers are employed in the union sector and too many in the nonunion sector. Additional losses in output occur if workers shed from the union sector fail to find employment elsewhere. To this outcome it is less formally argued that there will be further output losses associated with union work rules and strikes.

Much early work was devoted to calculating the losses in output. This research suggested that the inefficient use of labor resulting from unions was but a tiny proportion of GDP. However, the estimates could be materially inflated by taking account of the resources expended by unions in erecting and preserving the differential, by allowing for wage rigidities which limit the absorption of surplus

labor shed from the union sector, and by making various assumptions about the costs of the union rule book.<sup>1</sup>

But, as is well known, the debate has long moved on. First, an important and primarily empirical literature has suggested that union regimes may in practice be associated with higher productivity due to union-induced changes in the workplace. This newer empirical literature has its intellectual roots in the "collective voice" model of Freeman and Medoff (1984). Given an appropriate response from management, it is argued that unions lower turnover and establish more effective governance structures in work places characterized by public goods (i.e. shared working conditions), complementarities in production, and long-term contractual relationships. As we shall see, rather awkward results from separate profitability studies (that universally pointed to lower profitability in union regimes), and very mixed results from a very large number of (largely U.S.) productivity studies spawned by the collective voice model, shifted attention away from productivity effects and toward a consideration of unionism's longer-term consequences.<sup>2</sup> This new literature in part reflects a second challenge to the simple neoclassical model. In a nutshell, that model appears to be deficient in that it ignores the technical point that union settlements on the demand curve may not be efficient. If unions and management bargain simultaneously over wages and employment - rather than the union setting the wage and the firm adjusting employment by moving up its demand curve, as in the monopoly union model - it can be shown that outcomes on the demand curve are unlikely to be Pareto optimal (McDonald and Solow, 1981). That is to say, for any given wage-employment combination on the demand curve there generally exists some combination off that curve with lower wages and greater employment that is preferred by both the union and the firm since it affords the former higher utility and the latter higher profit. These preferred and "efficient" settlements are located on a so-called contract curve. It is conventional to identify a strong efficiency case that corresponds to a vertical contract curve. In this special case, the union has no real effects: output, prices, capital investment, and employment are identical to the competitive (i.e. union-free) case. The parties may thus be envisaged as maximizing the total value of the enterprise and then bargaining over the division of the surplus. A reduction in profit, the firm's share, vis-à-vis the competitive outcome, coupled with little or no measured effect on productivity is thus quite consistent with internal efficiency. Indeed, this is one possible interpretation of the balance of the empirical literature noted in the previous paragraph.

But to complicate matters this cooperative bargaining scenario is by no means the end of the story. First, there is no guarantee that actual outcomes will lie on the contract curve. But abstracting from this, and assuming cooperative behavior, there is

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<sup>1</sup> The most recent estimates of the efficiency losses associated with the union wage premium are provided by DeFina (1983). See also Hirsch and Addison (1986, Chapter 7).

<sup>2</sup> For a review of the U.S. evidence, see Addison and Hirsch (1989) and Hirsch (1991). The more limited U.K. findings are surveyed in Metcalf (1990, 1993).

the issue of union effects over the long run, since the basic model we have just described holds capital constant. No investment distortions are implied if bargaining is completely cooperative. In such cases, collective bargaining will again maximize the joint surplus of the enterprise, comprising the (present value) of shareholder returns and union rents (namely, the excess of union over nonunion remuneration). All that will be observed is redistribution, with the union premium taking the form of a lump-sum tax. But note that fully cooperative collective bargaining requires contracts that are binding over long intervals and that the union evaluate its utility over a time span that is identical to that over which the firm evaluates its future returns. Although it is possible to reconcile the reality of, say, annual contracts with a long-term contractual relationship in the sense that (infinitely) repeated bargains may lead to cooperative outcomes, the other part of the problem - different time horizons - still remains. These may be expected to diverge, being shorter for the union for two main reasons: first, since union members do not have ownership rights in the union they will not take into account the interests of future union members (i.e. they cannot sell their union cards); second, and relatedly, the union median voter who is likely to decide policy may be expected to be a relatively senior worker, which will further shorten the time horizon of the union. To make matters more concrete, the distortions we have in mind stem from the tendency of the union to attempt to appropriate the quasi-rents to firm-specific, long-lived capital that form the normal returns to such capital. (Note that we do not refer to the quasi-rents arising from the market power of the firm, appropriation of which is neutral from an efficiency perspective.) Confronted by this risk, the rational firm will logically respond by reducing these investments. So although the bargaining relation may be described as cooperative, it may not be fully cooperative and unions may still be distortionary and affect long-run behavior relative to the nonunion outcome. To quote Hirsch (1992, 100): "Although efficient (cooperative) contracting in this situation maximizes the sum of owner and union member "wealth," rational union myopia results in lower investment than obtains in a nonunion firm, shifting returns more heavily toward the present and away from the heavily discounted future."

The distortions are of course more profound and obvious where bargaining is non-cooperative *ab initio*. But, to repeat, even in cooperative bargaining situations there will also be reduced investment in long-lived, firm-specific capital if, as is likely, the time horizons of unions and shareholders differ.<sup>3</sup>

Various suggestions have been made on how to reduce the union tax on investment. These include such devices as profit-related pay, employee stock ownership, and the development of long-run bargaining protocols. Another solution that has commended itself is of course deregulation. Abstracting from the latter, perhaps draconian solution, many observers would point to the more fundamental

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<sup>3</sup> For a novel, but ultimately unsatisfactory, empirical treatment of the role of discounting in influencing cooperative bargaining behavior, see Kahn (1993). For an accessible formal treatment of investment under unionism, see Addison and Chilton (1995).

need for good industrial relations and concertative or participative institutions - which may themselves have to be mandated.

One such institution is the works council, the theoretical function of which is to promote labor-management cooperation with the goal of increasing the size of the economic pie, and to foster forward-looking behavior on the part of workers. Recalling our preceding analysis, works councils are also the classic instrument of collective voice. The benefits of the works council along the dimensions of information, consultation and participation have recently been restated by Freeman and Lazear (1993). Although the authors' arguments will be elaborated upon in section IV, three strands of their treatment might usefully be identified here. First, it is argued that if consultation is to achieve creative solutions there must also be participation or codetermination, even if this is achieved at the price of some delay in decision-making.<sup>4</sup> Second, works councils will either not be provided or under-provided in the market despite their efficiency properties. This market failure argument has also been applied to participative institutions more generally by Levine and Tyson (1990) in a different model emphasizing the prisoner's dilemma.<sup>5</sup> Third, it is argued that the power of the works council should be bounded in some way, since workers might be expected to seek more power than is socially optimal. Interestingly, the German works council fits the bill in each of these respects, which might imply that we would be able to detect productivity enhancing effects in the German data.

From this brief review of the theory, it is apparent that the efficiency case against unions is not black and white and that there may even be a presumption in favor of works councils under certain circumstances. Much must be remitted to the level of the empirical evidence, to which we next turn. But we would caution that this evidence does not address the portability of German institutions, which should be viewed as a distinctly different issue.

### 3. The Empirical Evidence for Germany

German evidence on the impact of worker representation on economic outcomes is less comprehensive than that for the United States. The bulk of the German

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<sup>4</sup> This emphasis upon participation is also the hallmark of the recent literature examining the effectiveness of profit sharing and employee stock ownership plans. For a review, see the essays in Blinder (1990).

<sup>5</sup> Levine and Tyson argue that if all firms adopted participative machinery all would benefit through higher productivity. But participatory firms require, among other things, compressed wage structures to encourage group cohesiveness and dismissals protection to lengthen the time horizon of workers. "Traditional" firms, on the other hand, are said to motivate through the fear of unemployment and a sharply differentiated wage structure. The emergence of the participative firm may thus be prejudiced by adverse selection (it will attract the work-shy) and by an externality (the poaching of the participative firm's most productive workers by traditional firms who can pay more). Without some participation mandate (or perhaps just-cause statute), so the argument runs, the market will be systematically biased against participatory work places and the economy can become locked in a socially suboptimal position.

literature relates to productivity and innovation effects. The evidence pertaining to profitability is much more sketchy, and there is almost no information on investments in physical capital. The distinctive element of the German research is that it contains data on formal plant-based institutions, although the relationship between unionization and works councils remains unsettled.

*(i) Unions and Productivity*

Most studies of the effect of unions on productivity have made use of the unions-in-the-production-function test, suggested by Brown and Medoff (1978). This test involves estimating a modified Cobb-Douglas production function across firms and industries with different levels of unionism. The dependent variable is either value-added per employee or (preferably) physical output per unit of labor. The independent variables include the capital-labor ratio (to take account of the substitution of capital for labor as firms react to union pay premia by moving up their labor demand curves), other controls (such as establishment size), and of course a measure of union density and/or a dummy variable picking up the union status of the individual worker. A positive coefficient estimate for the unionism variable is taken as *prima facie* evidence that unions have net beneficial effects on productivity, and conversely.<sup>6</sup>

Three of the studies cited in Table 1 have followed this basic approach. In fitting a time-series variant of the Brown-Medoff production function to economy-wide data for 1955-84, Schnabel (1989) obtains a negative coefficient on his union measure. But the coefficient estimate is scarcely different from zero (t-ratio=-1.6). Moreover, its magnitude is tiny: a 1 percentage point increase in union density is estimated to lead to a reduction in productivity of less than 0.003 percent. A similar directional effect of much the same size is reported in the cross-section study of Addison, Genosko, and Schnabel (1989) and this time the coefficient estimate is patently insignificant - a result also found in another cross-section study by Lorenz and Wagner (1989).

The conclusion from these studies that unionism - as measured by union density - has if anything a modest, retarding effect on productivity, although it casts some doubt on the basic Freeman-Medoff thesis, must remain tentative for a number of reasons. In the first place, a slew of statistical difficulties cloud interpretation of the findings. These include problems of simultaneity, selectivity, aggregation and specification, and limitations of the data and control variables. And since differences in technology, management quality, and other (often unobservable) factors between unionized industries and firms industries cannot be adequately represented in the estimating equations, it is clearly difficult to disentangle the direct effects of unionism from its indirect effects (stemming from management response) or from the influence of other determinants of productivity.

Table 1: Analysis of the Effects of Worker Representation on Productivity in western Germany

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<sup>6</sup> On the mechanics of the test, see, inter al., Addison and Chilton (1993).

Study	Sample/data	Productivity	Union indicator	Union effect
FitzRoy and Kraft (1987)	61/62 small and medium-sized firms in the metal-working industry 1977/79	total factor productivity	presence of a works council (union density)	negative (positive)
Schnabel (1989)	economy-wide, time-series analysis for 1955-84	labour productivity (GDP per employee)	union density	negative (but statistically weak)
Addison, Genosko, and Schnabel (1989)	30 industries organised by 12 different trade unions, 1983	labour productivity (value added per employee)	union density	insignificant (negative)
Lorenz and Wagner (1989)	29 manufacturing industries, 1985	labour productivity (value added per employee)	union density	negative (but statistically weak)
Kraft (1992)	20 industries organized by 6 different trade unions, 1970-87	growth rate of total factor productivity	union density	negative
Addison, Kraft, Wagner (1993)	49 firms in two Länder, 1990/91	total factor productivity	presence of a works council	positive (but statistically weak)

In the second place, our earlier theoretical remarks have indicated that, if there is efficient bargaining, we should not expect output and employment (and hence productivity) in the union sector to diverge in the short run from that in the nonunion sector. The muted effects of German unions are not inconsistent with this position, if not the basic collective voice model. But thirdly, and more fundamentally, it might reasonably be argued that the essentially "American" hand-me-down flavor of these tests *per se* does not take account of the institutional peculiarities of the dual industrial relations system in Germany. Specifically, the narrow focus on unions *per se* ignores the role of the works council which is the voice of labor at the plant level, providing not only a formal and continuous channel of labor-management communication and cooperation but also, through its participative or codetermination functions, a power to oppose many managerial decisions. For both reasons, positive and negative, it is the works council rather than the union that might be expected to have the more decisive influence on productivity. In the words of FitzRoy and Kraft (1987, 494-95): "If a significant efficiency-voice effect is anywhere plausible, then it is surely in the practice of the works council ... in West Germany."

FitzRoy and Kraft (1987) were the first to attempt to isolate the effect of works councils on productivity, using two years of data on small and medium-sized firms in the metal-working industry - the mean establishment size of their sample is 600



employees.<sup>7</sup> They employ two worker representation indicators - union density and a dummy variable indicating the presence or otherwise of a works council<sup>8</sup> - together with an extensive set of firm controls. FitzRoy and Kraft provide simultaneous-equation estimates of total factor productivity (measured as the residuals from a three-factor Cobb-Douglas production function) and the probability of observing a works council, and not the usual single-equation specification. In other words, the authors seek to model the presence or otherwise of a works council (i.e. endogenize works council status) in conjunction with the determinants of productivity that include the works council. They report that the coefficient estimate for the works council variable in the productivity equation is negative and significant, while that for the productivity measure in the jointly estimated equation capturing the probability of observing a works council is positive and significant. By contrast, the union density measure is positive in both equations, significantly so in the productivity equation. In short, purged of any feedback effect from productivity to works council status, the presence of a works council is associated with reduced firm performance, while the broader worker representation variable (belonging to a union) is associated with improved performance.

FitzRoy and Kraft find this evidence to be consistent with their management push/managerial competence model (first articulated in FitzRoy and Kraft, 1985). Hard-driving managers are said to elicit more output from their workers and are rewarded with higher salaries and profits. The workers react by joining a union, which outcome results in the positive relation between productivity and union density noted earlier. They are also more likely to elect a works council - both for protection and to obtain a compensating wage differential for their greater effort. Independently, by limiting managerial flexibility, works councils have an adverse effect on productivity; or, expressed another way, better managers can avoid the threat of a works council by offering better conditions and alternative channels of communication.

FitzRoy and Kraft's argument that the existence of a permanent works council with extensive legal and other powers should have at least as much influence as union representation and periodic collective bargaining outside the firm if the collective voice model is valid now appears to be accepted by all sides in the ongoing debate over what it is that unions do. Despite reservations as to the representativeness of

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<sup>7</sup> The firms in FitzRoy and Kraft's sample range in size from 10 to 6,000 workers. The authors acknowledge that their results cannot directly be generalized to large firms, by which they would seem to mean that their model cannot directly be tested in a sample made up of exclusively of large firms with near universal works council coverage.

<sup>8</sup> It is widely believed outside of Germany that works councils are automatic, subject to the plant having five or more permanent employees. In fact, they are a right German workers may exercise if they so choose. In the sample of firms used by FitzRoy and Kraft some 80% have a works council. This value is well above the average for German industry of 24% reported by Frick and Sadowski (1993), which inevitably raises questions as to the representativeness of the results reported below.

their results, alternative explanations to fit the awkward facts uncovered by FitzRoy and Kraft have not been forthcoming however. And more recent analyses at the firm level do not exactly resuscitate the collective voice model, at least for this outcome indicator. Thus, although Addison, Kraft, and Wagner (1993) obtain a positive coefficient estimate for the works council dummy in a single-equation specification of the correlates of total factor productivity for their sample of 50 or so manufacturing firms, that estimate fails to achieve significance at conventional levels. (Other aspects of this study are reviewed below.)

To our knowledge, just two studies have attempted to peer inside the black-box of worker representation (pro)productivity mechanisms. They reach opposite conclusions. In the first such study, Kraft (1986) reports that it is *individual* rather than *collective* voice that reduces voluntary turnover in his sample of 123 metal-working firms. Individual voice refers to the decision rights of individual (blue-collar) workers "on investment and rationalization, co-ordination of work groups, and other personnel decisions, and the determination of the (individual) job design" (Kraft, 1986, 702). The variable was constructed by the author from categorical responses from management concerning the degree of worker involvement in these areas. Collective voice, on the other hand, is captured by a works council dummy variable, and presumably to a lesser extent by union density. Note that the dependent variable used in this study is not a continuous measure of voluntary turnover but rather a dummy capturing "high quit rates," again derived on the basis of management responses - 37% of firms in the sample claimed to have high quit rates. Kraft's single-equation probit estimates of the determinants of high quit rates suggest that turnover is sharply reduced the greater the opportunities for the expression of individual voice, but neither the works council nor the union density variable is statistically significant. These results are not disturbed when the author uses simultaneous systems of equations; indeed, the role of individual voice is both strengthened and better determined.

In the second study, Frick and Sadowski (1993) examine actual quit rates for a much larger sample of firms ( $n=1,616$ ), taken from the Büchtemann-Höland (1989) data base. Using a single-equation specification, Frick and Sadowski report a strongly significant negative association between presence of a works council and quit rates: other things being equal, firms with a works council have quit rates that are 2.4 percentage points lower than those of their counterparts without workplace representation. For its part, union density is statistically insignificant.

As was noted earlier, debate on the impact of worker representation has moved on from an investigation of static effects toward a consideration of its effects on long-run performance. One such indicator is productivity growth. (Others are examined below.) In the only extant German study, Kraft (1992) examines the relationship between unionization and the growth in total factor productivity, using pooled data on 20 industries for the sample period 1970-87. Union density is found to be associated with significantly slower growth. Statistical problems are such,

however, that Kraft (1992, 430) concludes only that "a negative impact is more plausible than a positive one."<sup>9</sup>

The statistical difficulties alluded to by Kraft are real. In addition to the standard difficulties mentioned earlier that confront all analyses of productivity data, German studies typically suffer from the problems of very small sample sizes at both the micro and industry levels, and indeed an absence of official data on union density at the latter more aggregative level. The assumptions made by analysts in round-about calculations of union density doubtless influence, albeit in an unknown way, the results obtained in the productivity studies.

Overall, subject to these caveats, there is little in the productivity literature to suggest that works councils taken in conjunction with the institutional framework in which they are embedded - viewed by many as a near ideal environment for the expression of collective voice - have beneficial net effects on productivity. The studies cited in Table 1 have typically reported that the direct effects of worker representation are insignificant or negative. From the perspective of the standard collective voice model, then, the suggestion is that whatever the positive effects of unionism these appear to be counterbalanced and perhaps outweighed by traditional monopoly effects. But, to repeat, these are (with one exception) static effects. We now turn to examine whether the longer-term effects are any more favorable.

### *(ii) Unions and Innovation*

Results of studies investigating the effects of worker representation on innovative activity are summarized in Table 2. The industry-level studies of Schulenburg and Wagner (1991) and Schnabel and Wagner (1992a) report an absence of any statistically significant relation between union density and innovative activity at this level of aggregation. This basic result holds across various model specifications and for different definitions of the dependent variable. (As shown in the table, the industry-level innovation measures comprise the percentage of revenues spent on R&D, the percentage of employees working on R&D, and the proportion of total shipments made up of new products.)

Table 2: Analysis of the Effects of Worker Representation on Innovation in western Germany

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<sup>9</sup> Since Kraft's results have often been misinterpreted, some additional remarks are in order. Apart from the union density variable, Kraft also employs dummy variables identifying particular unions. For two of these unions - IG Metall and IG Chemie - positive and statistically significant coefficient estimates are obtained. But this finding does not indicate that these two unions are associated with higher growth. To the contrary, the magnitude of the coefficient estimates for these two union dummies is insufficient to overturn the overall negative impact of union density. In other words, all that this particular result informs us is that for IG Metall and IG Chemie the negative effects on growth are less negative than for other unions.

Study	Sample/data	Innovation measure	Union indicator	Union effect
FitzRoy and Kraft(1990)	57 small and medium-sized firms in the metal-working industry, 1979	proportion of sales consisting of products introduced within the last five years	interaction of union density and presence of a works council	organized labour significantly reduces innovative activity
Schulenburg and Wagner (1991)	29 industries, 1982/83	percentage of shipments in the market entry phase	percentage of female employees (inverse proxy for union density)	unionization is negatively related to innovative activity in numerous specifications, but this effect is not statistically significant in 3SLS estimates
Schnabel and Wagner (1992a)	29 manufacturing industries, 1984/85	i) R&D expenditures /sales ii) percentage of employees working in R&D	estimate of union density employees	unionization does not significantly affect innovative activity
Schnabel and Wagner (1992b)	78 manufacturing firms, 1990/91	dummy variable for introduction of a new product in 1989	i) presence of a works council ii) average percentage value of wage drift	union indicators do not significantly affect innovative activity after controlling for firm size
Schnabel and Wagner (1993)	i) 26 industries, 1983/84 ii) 31 manufacturing firms, 1990/91	R&D expenditures /sales	i) estimate of union density ii) union density; presence of a works council	i) unionization does not significantly affect innovative activity ii) unionization and presence of works council positively related to R&D activity only if less than about half of the employees are union members, negatively otherwise

Rather different results are reported by FitzRoy and Kraft (1990) on the basis of firm-level data - results that are consistent with their findings on productivity, reviewed earlier. In a break with past practice, the authors use a worker representation measure that is a composite of union density and presence of a works council. The continuous union density measure is interacted with the works council dummy variable on the grounds that greater density is associated with a higher probability of observing a works council and that the latter is more influential when the workforce is more highly organized. It is found for this sample of small firms that the composite worker representation variable is negatively associated with the innovation measure, namely, the proportion of sales consisting of products introduced in the last five years. Interestingly, there is no evidence of any positive feedback from innovative activity to worker representation in the authors' simultaneous equation estimates - which one might have anticipated on rent-seeking grounds.

FitzRoy and Kraft also note that, taken in isolation, union density is negatively and significantly associated with their innovation measure - though they do not report corresponding results for the works council dummy entered as a separate regressor.

Using data for a larger and more recent sample of firms (but with a less comprehensive set of controls) and different measures of innovation and worker representation, Schnabel and Wagner (1992b) find evidence of a well-determined positive impact of union influence at the plant level. But this result is highly sensitive to specification: as shown in Table 2, this beneficial impact of plant-level unionism abruptly vanishes once a control for firm size is added.

The final innovation study considered here uses a common specification applied to both industry and firm data. Schnabel and Wagner (1993) find no statistically significant effect of union density (constructed from union membership functions estimated from a large sample of micro data) on R&D intensity for their 26-industry sample. At the establishment level, however, union density appears to exert a strongly negative effect on innovative activity, whereas the presence of a works council is associated with higher R&D intensity. Arguing that the works council dummy variable may be also viewed as an indicator of union density, the authors use the coefficient estimates for the two measures of worker representation to provide a simple calculation of the critical level of union density at which the beneficial impact of a works council union is lost. This occurs at a level of workplace organization of 51 percent. In short, the argument is that "some" unionism, taken in conjunction with works council presence, is productive of innovative activity but that "too much" unionism is harmful.

German literature with a bearing on intangible capital formation again yields a mixed bag of results. The industry level findings are perhaps the least informative. And, at the disaggregative level, there is some evident disagreement between the firm studies. One obvious difficulty is the role of inadequate controls in exercises where works council status is not endogenized, while data limitations and identification problems inevitably weaken the attempts to model that status. Differences in results may in part reflect the distribution of firm size in the various samples. But there is also one tenuous line of possible agreement, concerning the role of unionism proper: higher union density in conjunction with works council presence may produce unfavorable outcomes. That said, the mechanisms producing this result have not formally been addressed. Analysis of the interrelationship between the two types of workplace representation, however, is less pressing than the need for larger and preferably longitudinal data sets and the development of a much richer set of controls.<sup>10</sup>

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<sup>10</sup> For completeness, we should perhaps also note a recent study by Warnken and Ronning (1990) that finds evidence of a positive association between the percentage of workers covered by collective agreements protecting employees against loss of income due to technological change (including both Kündigungsschutz and Verdienstsicherungsabkommen) and investment in high-technology equipment. In particular, changes in innovation (comparing 1984/85 with 1979/80) are reported to be much higher in sectors with a high degree of protection (defined as 30% coverage) than in those with medium (10-20%) or low (<10%) protection: the corresponding changes in innovation are 37.88, 17.56, and 21.72%, respectively. But the suggestion that such agreements have led to the introduction of new

Finally, there is almost no evidence of union impact on tangible capital formation with which to provide possible points of contact with the innovation literature. (Recall that a rent-seeking model would suggest similar union impacts on both tangible and intangible capital.) The only evidence of which we are aware is contained in the study by Addison, Kraft, and Wagner (1993), encountered earlier (see Table 1). The authors report that firms with a works council have significantly lower gross (but not net) investment in relation to capital stock, other things being equal. The suggestion that works councils adversely affect investments in physical capital must be treated with some caution, however, both because of the standard statistical problems cited earlier and the weak overall performance of the authors' investment equations.

*(iii) Unions and Profitability*

Unionism may lower investments in physical and intangible capital through the indirect route of reduced profits, if such profits provide a low-cost source of funds for investment. And there is every indication for the U.S. of both direct and indirect effects. For example Hirsch's (1991) results suggest that unionized companies invest some 20 percent less in physical capital than do otherwise similar nonunion companies; one half of this impact is calculated to be the direct effect of the union tax on the returns to such capital, and one half to reflect the lower current profits among unionized companies. (A similar overall impact is also found for intangible capital, but here the direct effect dominates the profits effect.)

Unfortunately, there is little evidence on the consequences of German unions for profitability. In a cross-section analysis of industry data for 1983, Mainusch (1992) finds a statistically significant negative relation between an industry's profit rate and its level of union density. In separate specifications, the coefficient estimate for a measure of market concentration (specifically, a Herfindahl index) interacted with union density is significantly negative. Mainusch's strong results are subject to the important caveat that they are derived from a very parsimonious specification, raising the usual difficulties associated with omitted variables.

There are but two firm-level studies. Although they report that works councils appear to retard investment in physical capital, Addison, Kraft, and Wagner (1993) can find no evidence of a reduction in firm profitability. The negative coefficient estimate for presence of a works council is not statistically different from zero. But again the authors' results are obtained from single-equation estimates.

Only FitzRoy and Kraft (1985) provide estimates from a fully simultaneous system of equations. Indeed, they offer a four-equation system in which the endogenous variables are hourly wages, percent of the workforce unionized, firm

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technology should be resisted, not least because causation might easily run in the opposite direction. More formally, multivariate regression analysis of the determinants of innovative activity is required and the sample period should be extended to cover intervals when such agreements were not in operation. As part and parcel of this exercise, one important issue that has to be addressed is whether these agreements are synonymous with unionism.

profitability, and salaries. The system of equations are estimated over pooled data for 1977 and 1979 for a sample of 61/62 firms. The basic finding is that union density is positively and significantly associated with hourly wages, salaries, and profitability, while exactly opposite results are found for works councils. This evidence is of course consistent with the authors' managerial pressure/managerial competence story, encountered earlier. The bottom line, therefore, is again that unionism is akin to an intervening variable, while the potentially corrosive influence of the works council - on company profits and threats to management salaries - can be side-stepped through the device of adequate alternative systems of communication and higher wages.

Once again, only FitzRoy and Kraft are able to tell a more or less consistent story, though there is still the issue of the representativeness of their results.

#### **4. Lessons of Wider Application?**

At the outset, we noted that aspects of the German system of worker representation are the subject of much international interest, even perhaps more so than its training system (which is of course not to suggest that the latter can be divorced from the "system" of industrial relations). Two practical examples and one piece of applied theoretical work might usefully be cited as indicative of this interest. First, there is every suggestion that the Dunlop Commission,<sup>11</sup> charged with examining the state of U.S. worker-management relations, will recommend something akin to the German works council in its final report to be issued in December 1994.<sup>12</sup> Note that any such recommendation will require changes in U.S. labor law and, in particular to sections 8(a)2 and 2(11) of the National Labor Relations Act. This would therefore represent a nontrivial development.

The interest of the European Commission is yet longer-lived. It should be recalled that in 1975 an amended version of the 1970 draft regulation on the statute for a European Company provided for employee representation on obligatory supervisory boards of companies or those organizations that elected to form a "European Company." As full board members, employee representatives would participate in all matters concerning the management and progress of the company, as dealt with by the supervisory board. In addition, the draft legislation also called for directly elected European Works Councils (EWCs). The management board was to meet regularly with its EWC to report among other things on the economic and financial position of the company, the investment program, new working methods, and rationalization plans. The EWC was also to be consulted on job evaluation and piecework rates. And it had codetermination rights: the management board could only

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<sup>11</sup> The Commission's remit is to investigate whether workplace productivity can be enhanced by greater labor-management cooperation and employee participation. It also has the task to consider the impact of current labor law and collective bargaining practices on such cooperative efforts. The Commission issued an interim, fact-finding report on June 2, 1994 (see U.S. Department of Labor, 1994).

<sup>12</sup> For one such scenario involving mandatory "employee participation committees," see Weiler (1990).

proceed with its agreement with respect to rules on recruitment, vocational training, the fixing of terms of remuneration, measures relating to health and safety, and holiday schedules, *inter al.* The resemblance to German institutional forms and their obligations is readily apparent.

Mandatory worker representation on supervisory boards was also proposed in 1972 under the draft Fifth Directive on company law. Amendments to this directive were made in 1983 to take account of the reality of unitary board systems in some member states and to permit a somewhat wider menu of choice than worker directors alone. One such option included worker representation in a "separate body" akin to the German works council. Similar changes were introduced into the European Company Statute in 1989. In both cases, the participation as opposed to the information and consultation requirements of the proposed legislation were somewhat attenuated. Even so, neither proposal has yet entered the statute books.<sup>13</sup>

As is well known, the EWC component of early variants of the European Company Statute was subsequently removed and made the subject of separate legislation. At the time of writing, the Council of the European Union has adopted a "common position" on a draft directive establishing multinational works councils in Community-scale undertakings, via the so-called social chapter route, and so the measure seems destined to pass into law during the German presidency. It will then join legislation on collective redundancies, which requires of employers somewhat wider information disclosure provisions than the 1975 law and contains language on the need to minimize layoffs while calling for "social measures," analogous to social plans in Germany (*Sozialpläne*), where these layoffs cannot be avoided. As further indications of the influence of the German model, we would note the particular worker consultation provisions of Community-level health and safety legislation, together with moves to increase employee information and consultation during the introduction of new technology under the social dialogue experiment.<sup>14</sup>

Such imitation is the sincerest form of flattery. More recently, German works councils and that country's form of collective bargaining have also received intellectual benediction in the work of Freeman and Lazear (1993), even if they are cautious in recommending the exportation of works councils to previously decentralized bargaining regimes (see below). Freeman and Lazear argue that works councils be mandated since neither firms nor employees (nor for that matter union leaders) have adequate incentives to install them voluntarily. Works councils, so the argument runs, have the potential to increase the joint surplus of the enterprise, but

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<sup>13</sup> Our preceding evaluation of worker representation has omitted any discussion of the impact of worker directors - a tabular presentation of analogous research in this area is contained in Frick and Sadowski (1993). Nevertheless, the controversy attaching to this form of codetermination, and to *Montanmitbestimmung* in particular, should at least be noted by foreign observers.

<sup>14</sup> For additional material on Community legislation and social policy in the European Union, including progress on all the measures cited above, see Addison and Siebert (1991, 1994, 1995).



management will give them too little power and workers demand more power than is socially optimal. The key to the argument is that although total surplus is increased the firm's share will be reduced and the workers' share increased. (In effect, the authors have in mind a potential rather than an actual Pareto improvement.) Because workers will seek too much power for the council, Freeman and Lazear see much to commend the German industrial relations set-up because pay and fringes are determined outside the enterprise through industry-level bargaining and the strike weapon is foreclosed.

The scope for improvement in joint surplus reflects the benefits of information exchange, consultation, and participation or codetermination. Information asymmetries underpin the need to mandate beneficial information exchange. The authors provide a simple theoretical model to indicate how management's use of the council as a communicator to workers about the state of nature can yield the optimal provision of effort on the part of workers, although they readily admit that they know of no specifically German evidence on such productive benefits of council-facilitated information flows. Similarly, councils are said to improve the communication from workers to management by increasing the incentives of the former to disclose private information now that workers have control over how that information will be utilized.

Consultation and participation permit new solutions to the problems faced by the firm. The requirement is that the private information possessed by the worker side be valuable and hence admit of a better solution than can be reached by management alone. The cost takes the form of delays in decision-making, so that even in this model the case for councils does not follow automatically. That case, to repeat, hinges on new or creative solutions. Finally, codetermination on the German pattern by providing workers with increased job security is said to inculcate in workers a longer-run view of the prospects of the firm. (As was noted in section 2, disparate time horizons imply distortions even under efficient bargaining contracts.)

Enough has been said to indicate that the German model of industrial relations is being taken very seriously outside the country at both practical and theoretical levels. Yet although the advantages of that system appear transparent to outside observers, the evidence reviewed in section 3 is opaque. Much the same is true of the broader literature on corporatism (see, for example, Schnabel, 1993). But, to mix literatures, disenchantment with the Swedish model has allowed Germany to assume the mantle of exemplar even at a time when its own institutions are coming under pressure and greater domestic scrutiny and when the works councils is being accorded a larger bargaining role through works agreements, *inter al.*

At the level of theory, too, the case for mandates is being pressed with increasing vigor. Today, asymmetric information rather than the prior emphasis on monopoly and externalities is the cause célèbre justifying intervention in the market (e.g. Aghion and Hermalin, 1990; Addison, Barrett, and Siebert, 1994). Worker participation is simply one of the most recent additions to policy in this respect. But even abstracting from the vexed question of the specific content of a mandate (e.g. what are the exact powers to be set for the works council?), it is crucially important to

address the issue of whether the observed limited provision of a particular benefit stems from market failure or is instead a result of optimizing behavior in a situation of irreducible information deficiencies and inherent differences in the ability of the parties to commit.<sup>15</sup> There is also the problem of assessing the consequences of "neutral" redistribution in all these models for capital investment and growth. That is to say, all too often interventionists are content with the conclusion that transfers are lump-sum.

Finally, there is the issue of the portability of institutions across national boundaries. There is at least the suspicion that, despite the watering down of Community mandates under the social charter, the social affairs directorate of the European Commission still believes in setting mandates by reference to some best-practice standard. We have already commented on the role of Germany in this regard. But, as almost all students of works councils admit, councils operate in a particular context. Thus, Freeman and Lazear (1993, 28) are concerned to emphasize their analysis assumes that "the internal operation of councils is determined outside the enterprise." Similarly, Frick and Sadowski (1993, 31) caution: "Any attempt to implement mandatory works councils without simultaneously creating the necessary institutional structure neglects the interdependencies in the system of labor market institutions, nationally organized industry unions, government intervention and system of labor courts." In addition to institutional design, which can be copied, attention should be paid to the accompanying social norms and values, which cannot easily be transferred. The German institutional framework, of which works councils and nationally organized industry unions are a part, reflects a system of values that accords high priority to accommodation and integration as well as order and authority (Schregle, 1978, 88). It is this preference for cooperation over conflict that would appear at once to distinguish the German "model" and limit its applicability to other countries - in particular, to those countries with a history of adversarial relations.

## 5. Conclusions

The jury is still out on the question of the economic effects of German systems of worker representation. Industry-level studies do not point to positive union outcomes, but not only are there problems in determining union density at this level of aggregation but also conceptual difficulties in assigning efficiency effects. It is at the level of the workplace that the most clear-cut effects of worker representation are to be expected. Here, the most econometrically sophisticated studies (by FitzRoy and Kraft) consistently point to negative effects of works councils in sharp contrast to the predictions of the collective voice model. However, as we have also intimated, caution should be exercised in generalizing the FitzRoy-Kraft results given the samples from which they are derived. Other studies using more recent data and sometimes a larger sample of firms - but eschewing any attempt to model the

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<sup>15</sup> For an amplification of these points in the context of mandatory notice, see Chilton and Addison (1994).

determinants of the presence of a works council - do not provide such a consistent pattern of results along the various dimensions of firm performance. The balance of the evidence from these other firm-level studies is still not particularly favorable to works councils, although one study of innovative activity does detect a beneficial works council impact with the caveat that this is sensitive to the level of union density - beyond some critical level of workplace organization positive effects turn negative! As in the U.S. literature, there is very little indication of the practical manner in which works councils might produce pro-productivity effects: the two turnover studies we have identified reach opposite conclusions.

But the disaggregative studies are all plagued by the problems of small sample size and their cross-section nature. Given the economist's inevitably parsimonious specifications, progress in analyzing the effects of workplace representation would seem to hinge on the development of larger samples and panel data. The extant attempts to endogenize works council status, though laudable, are inevitably subject to the criticism that they are superficial, ignoring potential differences between works councils, inter al. Failure to model the determinants of works council presence, on the other hand, runs headlong into problems of causation; difficulties that are underscored by the limited number of control variables deployed.

We should also allude to the deficiencies of theory. These include, but are not restricted to, the unsettled issue of union goals (see Addison and Chilton, 1995), the tendency to regard efficient contracts as the end of the analytical story as far as dynamic efficiency effects are concerned, and the almost knee-jerk equation of limited provision of benefits (and participative institutions) with market failure - without sufficient regard being paid to modeling and parameterization. The limitations are themselves an inauspicious backdrop to empirical inquiry and policy.

The bottom line is that the effects of German institutions of worker representation on economic outcomes are clouded. This elusiveness inevitably must mean that there are few if any immediate lessons of wider application in the German experience. Given the misleading and dangerous but perhaps understandable quest for exemplars (to which others should aspire) this pessimistic evaluation is not altogether without merit.

## References

- Addison, J.T./Chilton, J.B.: Can We Identify Union Productivity Effects? In: *Industrial Relations* 32 (Winter 1993) p. 124-32.
- Addison, J.T./Chilton, J.B.: Models of Union Behavior. In: *Handbook of Human Resource Management*, edited by D. Lewin/D.J.B. Mitchell/M.A. Zaidi. Greenwich, Connecticut: JAI Press, 1995 [forthcoming].
- Addison, J.T./Hirsch, B.T.: Union Effects on Productivity, Profits, and Growth: Has the Long Run Arrived? In: *Journal of Labor Economics* 7 (January 1989) p. 72-105.
- Addison, J.T., Genosko, J./Schnabel, C.: Gewerkschaften, Produktivität und Rent Seeking. In: *Jahrbücher für Nationalökonomie und Statistik* 206 (March 1989) p. 102-16.

- Addison, J.T., Kraft, K./Wagner, J.: German Works Councils and Firm Performance. In: *Employee Representation: Alternatives and Future Directions*, edited by B.E. Kaufman and M.M. Kleiner. Madison, Wisconsin: Industrial Relations Research Association, 1993, pp. 305-35.
- Addison, J.T./Barrett, C.R./Siebert, W.S.: *Mandated Benefits and Asymmetric Information*. Unpublished paper. Columbia, S.C.: University of South Carolina, May 1994.
- Addison, J.T./Siebert, W.S.: *The Social Charter of the European Community: Evolution and Controversies*. In: *Industrial and Labor Relations Review* 44 (July 1991) p. 597-625.
- Addison, J.T./Siebert, W.S.: *Recent Developments in Social Policy in the New European Union*. In: *Industrial and Labor Relations Review* 48 (October 1994) p. 5-27.
- Addison, J.T./Siebert, W.S. (eds.): *Labor Market Harmonization in Europe: An Investigation of the Issues*. Cambridge, England: Cambridge University Press, 1995 [forthcoming].
- Aghion, P./Hermalin, B.: *Legal Restrictions on Private Contracts Can Enhance Efficiency*. In: *Journal of Law, Economics, and Organization* 6 (Fall 1990) p. 381-409.
- Blinder, A.S. (ed.): *Paying for Productivity - A Look at the Evidence*. Washington, D.C.: The Brookings Institution, 1990.
- Brown, C./Medoff, J.L.: *Trade Unions in the Production Process*. In: *Journal of Political Economy* 86 (June 1978) p. 355-78.
- Büchtemann, C./Höland, A.: *Befristete Arbeitsverhältnisse nach dem Beschäftigungsförderungsgesetz (BeschFG)*. Bonn: Bundesministerium für Arbeit und Sozialordnung, 1989.
- Chilton, J.B./Addison, J.T.: *Nondisclosure as a Contractual Remedy: Explaining the Advance Notice Puzzle*. Unpublished paper. Columbia, S.C.: University of South Carolina, June 1994.
- DeFina, R.H.: *Unions, Relative Wages, and Economic Efficiency*. In: *Journal of Labor Economics* 1 (October 1983) p. 408-29.
- FitzRoy, F.R./Kraft, K.: *Unionization, Wages and Efficiency - Theories and Evidence from the U.S. and West Germany*. In: *Kyklos* 38 (1985) p. 537-54.
- FitzRoy, F.R./Kraft, K.: *Efficiency and Internal Organization: Works Councils in West German Firms*. In: *Economica* 54 (November 1987) p. 493-504.
- FitzRoy, F.R./Kraft, K.: *Innovation, Rent-Sharing and the Organization of Labour in the Federal Republic of Germany*. In: *Small Business Economics* 2 (1990) p. 95-103.
- Freeman, R./Lazear, E.P.: *An Economic Analysis of Works Councils*. Unpublished paper. Cambridge, Massachusetts: Harvard University, February 1993.
- Freeman, R.B./Medoff, J.L.: *What Do Unions Do?* New York: Basic Books, 1984.
- Frick, B./Sadowski, D.: *Works Councils, Unions, and Firm Performance: The Impact of Workers' Participation in Germany*. In: *Quint-Essenzen* Nr. 35. Trier: Institut für Arbeitsrecht und Arbeitsbeziehungen in der Europäischen Gemeinschaft, December 1993.
- Hirsch, B.T.: *Labor Unions and the Economic Performance of Firms*. Kalamazoo, Michigan: W.E. Upjohn Institute, 1991.
- Hirsch, B.T., *Firm Investment Behavior and Collective Bargaining Strategy*. In: *Labor Market Institutions and the Future Role of Unions*, edited by M.F. Bognanno and M.M. Kleiner. Oxford and Cambridge: Basil Blackwell, 1992, pp. 95-121.
- Hirsch, B.T./Addison, J.T.: *The Economic Analysis of Unions - New Approaches and Evidence*. London and Boston: Allen & Unwin, 1986.
- Kahn, L.M.: *Unions and Cooperative Behavior*. In: *Journal of Labor Economics* 11 (October 1993) p. 680-703.
- Kraft, K.: *Exit and Voice in the Labor Market: An Empirical Study of Quits*. In: *Journal of Institutional and Theoretical Economics* 142 (December 1986): 697-715.

- Kraft, K.: Produktivitätswachstum und gewerkschaftliche Organisation. In: *Jahrbücher für Nationalökonomie und Statistik* 209 (1992) p. 419-30.
- Levine, D./Tyson, L.D.: Participation, Productivity, and the Firm's Environment. In: *Paying for Productivity - A Look at the Evidence*, edited by A. S. Blinder. Washington, D.C.: The Brookings Institution, 1990, pp. 183-237.
- Lorenz, W./Wagner, J.: Bestimmungsgründe von Gewerkschaftsmitgliedschaft und Organisationsgrad. In: *Zeitschrift für Wirtschafts- und Sozialwissenschaften* 111 (1989) p. 65-82.
- Mainusch, S.: *Die Gewerkschaft als Determinante von Produktivität und Profitabilität*. Regensburg: Transfer Verlag, 1992.
- McDonald, I.M./Solow, R.M.: Wage Bargaining and Employment. In: *American Economic Review* 71 (December 1981) p. 896-908.
- Metcalf, D.: Union Presence and Labour Productivity in British Manufacturing: A Reply to Nolan and Marginson. In: *British Journal of Industrial Relations* 28 (July 1990) p. 249-66.
- Metcalf, D.: Industrial Relations and Economic Performance. In: *British Journal of Industrial Relations* 31 (June 1993) p. 255-83.
- Schnabel, C.: *Zur ökonomischen Analyse der Gewerkschaften in der Bundesrepublik Deutschland*. Frankfurt: Peter Lang, 1989.
- Schnabel, C.: Korporatismus, zentralisierte Tarifverhandlungen und makroökonomische Performance. In: *Zeitschrift für Wirtschaftspolitik* 42 (1993) p. 259-72.
- Schnabel, C./Wagner, J.: Unions and Innovative Activity in Germany. In: *Journal of Labor Research* 8 (Fall 1992a) p. 393-406.
- Schnabel, C./Wagner, J.: Unions and Innovation. Evidence From German Micro Data. In: *Economic Letters* 39 (July 1992b) p. 369-73.
- Schnabel, C./Wagner, J.: *Industrial Relations and Trade Union Effects on Innovation in Germany*. Unpublished paper. Lüneburg: University of Lüneburg, 1993. [Forthcoming in: *Labour* 8 (1994).]
- Schregle, J.: Co-determination in the Federal Republic of Germany: A Comparative View. In: *International Labour Review* 117 (January/February 1978) p. 81-98.
- Schulenburg, J.-M. Graf v. d. and Wagner, J. (1991) Advertising, Innovation and Market Structure: A Comparison of the United States of America and the Federal Republic of Germany. In: *Innovation and Technological Change: An International Comparison*, edited by Z.J. Acs and D.B. Audretsch. New York: Harvester Wheatsheaf, pp. 160-82.
- United States Department of Labor.: *Fact Finding Report. Commission on the Future of Worker-Management Relations*. Washington, D.C.: U.S. Department of Labor, May 1994.
- Warnken, J./Ronning, G.: Technological Change and Employment Structures. In: *Technological Change and Employment*, edited by R. Schettkat and M. Wagner. Berlin and New York: de Gruyter, 1990, pp. 215-53.
- Weiler, P.C.: *Governing the Workplace - The Future of Labor and Employment Law*. Cambridge, Massachusetts: Harvard University Press, 1990.